

LEARNING & TEACHING SERVICE

# FULL COURSE PROPOSAL FORM

(taught programmes only)

for **NEW COURSES** and  
**COURSE AMENDMENTS**  
with **RESOURCE IMPLICATIONS**

Please refer to the course proposal Procedure and Guidance CP-2013 to complete this or any other course proposal form: to ensure the correct form is being used; for information on early considerations and timescales; for general guidance on the course approval process; and for notes on completing the form.

Course Title(s)		new course? <i>note 1</i>		If no, please give existing course code	
Mathematics with a Foundation Year		Y			
School(s) of study & Faculty					
Mathematics, Science Faculty					
Proposer & proposer's school					
Dr Mark Cooker, (BSc Courses Director) MTH					
Proposed start date (of new course or of changes)					<i>note 2</i>
September 2015					
This proposal requires: <i>note 3</i>		Prior approval by Council		Y	N
		Prior approval by LTC		Y	N

This form is in 5 parts:

- Part 1      Summary and Rationale
- Part 2      Business Case
- Part 3      Academic Case including Programme Specification
- Part 4      Key Information Set (KIS) data
- Part 5      Approvals and Notification

The initiator is responsible for completing parts 1-4

## UEA LEARNING &amp; TEACHING SERVICE

## FULL COURSE PROPOSAL

## Part 1 SUMMARY AND RATIONALE

Course One			
<b>S1</b>	<b>a</b>	<b>SCHOOL(S) OF STUDY</b>	MTH
<i>note S1c</i>	<b>b</b>	<b>FACULTY or FACULTIES</b>	SCI
	<b>c</b>	<b>JOINT COURSE?</b> (ie owned/taught by more than one School)	<b>YES</b>
			<b>NO</b> ✓
	<b>d</b>	<b>NAME OF COURSE DIRECTOR</b> (Home School)	The Programme Director with overall oversight is Dr Ben Milner (SCI AD LTQ)  <b>Course Director will be Dr Mark Cooker</b>
	<b>e</b>	<b>NAME OF DEPUTY COURSE DIRECTOR</b> (partner School, for Joint Courses only)	N.A.
<b>S2</b> <i>note S2a</i>	<b>a</b>	<b>COURSE TITLE</b>	Mathematics with a Foundation Year
<i>note S2b</i>	<b>b</b>	<b>COURSE CODE</b>	TBC
<i>note S2c &amp; S2d</i>	<b>c</b>	<b>AWARD</b>	<b>BSc</b>
	<b>d</b>	<b>EXIT AWARD(S) AND TITLE(S)</b>	Possible exit awards: i) Certificate of Higher Education: to students who have successfully completed 120 credits at level 4 or above, at least 60 of which were completed at UEA. (ii) Diploma of Higher Education: to students who have successfully completed 240 credits, at least 100 of which are at level 5 or above, and at least 120 of which have been completed at UEA.
	<b>e</b>	<b>FULL/PART-TIME (please specify)</b>	FULL-TIME
	<b>f</b>	<b>LOCATION (UEA Norwich, UEA London, Distance Learning)</b>	UEA Norwich.
	<b>g</b>	<b>AVAILABLE FROM:</b>	September 2015
<b>S3</b> <i>note S3a</i>  <i>note S3b</i>	<b>a</b>	<b>PROFESSIONAL AWARD (if any)</b>	N/A
	<b>b</b>	<b>ACCREDITING/VALIDATING BODY (if relevant)</b>	N/A
		<b>Website (URL)</b>	

		<b>Date when accreditation/validation may take place</b>	N/A	
<b>S4</b> <i>note S4</i>	<b>LEVEL</b>	Sub-degree (e.g. Cert. Dip.)	Level 3	
		Undergraduate	Yes	
		Integrated Masters		
		Masters		
		Other postgraduate (please specify)		
<b>S5</b> <i>note S5a</i>	<b>a</b>	<b>DURATION</b> (years or months)	Four Years	
<i>note S5b</i>	<b>b</b>	<b>MODE OF ATTENDANCE</b> (full-time, part-time, distance, other)	Full-time	
<b>S6</b> <i>note S6</i>	<b>PLACEMENT(S)/WORK-BASED LEARNING REQUIRED</b>		YES	NO
				√
			If YES, does this conform with the UEA's code of practice on placements?	
<b>S7</b> <i>note S7</i>	<b>RELEVANT SUBJECT BENCHMARK STATEMENT(S)</b>		To conform with the benchmarking standard for Mathematics, Statistics and Operational Research (MSOR) laid down by the Quality Assurance Agency for Higher Education.	
<b>S8</b> <i>note S8</i>	<b>ENTRY REQUIREMENTS</b>		<p>GCSE English language and Mathematics (or equivalent) at a minimum of Grade C.</p> <p>The typical offer for students studying A levels will be CCC.</p> <p>Applications are welcome from NVQ level 3.</p>	
<b>S9</b>	<b>JACS Subject Level Code(s)</b> To be completed by the Planning Office following approval of the Business Case			
<b>S10</b>	<b>UCAS ADMISSION CODE / COURSE CODE</b> To be completed by the Planning Office following approval of the Business Case			
<b>S11</b> <i>note S11</i>	<b>FURTHER INFORMATION</b> available via...		<a href="mailto:m.cooker@uea.ac.uk">m.cooker@uea.ac.uk</a>	
<b>S12</b>	<b>COURSE HIGHLIGHTS</b> (for publication in University Prospectus / Website / other publicity) <b>N.B.</b> Please include employability prospects/career possibilities			
<i>note S12</i>	<p>The Foundation Year in Mathematics is designed to equip you with the knowledge and the many key skills which will help you to excel as an undergraduate within the School of Mathematics. We welcome applications from individuals who have not yet achieved our entry requirements to year 1 of our BSc programme. We also welcome mature students.</p> <p>Your foundation year will focus on developing mathematical knowledge and understanding. You will gain essential knowledge of many of the concepts, methods and techniques that you will need to progress into further and high level study in mathematics. Provided you meet our progression criteria, by the end of the foundation year you will be able to continue your studies in a BSc degree in Mathematics (or in Mathematics with Business).</p>			

	<p>You will benefit from expert advice and guidance from our academic staff. The School of Mathematics is consistently in the top ten among the many mathematics departments in the country, and we are proud of our exceptional scores in student satisfaction.</p> <p>The skills in problem-solving and logical analysis which you will learn while studying mathematics at foundation and higher levels, are in high demand by employers. After graduation students pursue a variety of careers in diverse areas, in particular, mathematicians are highly valued in:</p> <ul style="list-style-type: none"> <li>• Business and Management</li> <li>• Actuarial Sciences</li> <li>• Design Engineering</li> <li>• Teaching</li> <li>• Operations Research and strategic planning</li> <li>• IT, Communications and e-Commerce</li> <li>• Accountancy and Finance</li> <li>• Banking and Insurance</li> <li>• Marketing &amp; Advertising</li> </ul>
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\*\*\*\*Please copy and paste the above table for additional (related) courses\*\*\*\*

<b>S13</b>	<b>RATIONALE FOR PROPOSAL</b>
<i>note S13</i>	<p>Please explain why you are proposing this/these new course(s) or these course amendments, and why this proposal is being offered at this time. See guidance notes for further indication of what to include in this section.</p>
	<p>For 2014 entry, the Faculty of Science closed the original Science with Foundation Year (SCI-FY F008) course, and replaced it with school-specific courses, which follow an existing CMP model. This closure cut off a supply of able and often mature students who wanted to do a Mathematics BSc course.</p> <p>Mathematics is the only School in Science not to offer a programme with a foundation year. This course will meet a need to prepare some students for the knowledge and skills needed for successful study in the BSc Mathematics course. This was not possible in the previous model of SCI-FY.</p> <p>Since the planned introduction of school-specific Foundation-Year courses, MTH has reviewed the difficulty of nurturing students studying the subject who start at the University with less traditional entry levels. It is agreed that the expert teaching available, combined with some expected small class sizes for advanced material, will provide the academic support to develop, during a Foundation Year, the key skills required by students.</p> <p>Two distinct groups of possible applicants to MTH are currently deterred by the lack of a Mathematics Foundation Year. First are those who have some proven potential in mathematics, who may have recently rejoined studies with e.g. an Open University maths qualification (or non-traditional qualifications). Such students may not have a full set of A-levels. This also addresses a need to widen participation among students from less traditional backgrounds. A second group is those who have potential in mathematics, who have an A-grade in A-level maths, but who lack the required grades for entry to an Honours mathematics programme. The Foundation Year would bring out the mathematical potential of such applicants, to ready them for successful BSc studies. Both groups include students that we want,</p>

	<p>because they are committed to, and able in, maths. At the start a student may lack the necessary grades or qualifications, especially outside mathematics. After a successful Foundation Year, the same student will have the potential to complete a BSc mathematics programme successfully.</p>
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## UEA LEARNING &amp; TEACHING SERVICE

## FULL COURSE PROPOSAL

## Part 2 BUSINESS CASE

*note BC*

<b>BC1</b>	<b>ACADEMIC AND RECRUITMENT STRATEGY</b>	Consult with HOS, Faculty Dean, PLN, ARM (including Admissions)
<b>BC1.1</b>	<b>How does the proposal fit with the University's Corporate Plan?</b>	
<i>note BC1.1</i>	<p>The launch of the foundation programme will enable motivated and able students from non-traditional backgrounds and low participation areas, to gain the advantages of university education via UEA's existing Widening Participation and Outreach programmes. This is a key priority (3) within the UEA corporate plan document under 'The Student Experience.' The proposed course fully supports the University and Faculty strategy to admit a student body that is diverse and socially inclusive by developing a route to admit (onto Mathematics BSc programme) students with the aptitude and appetite to benefit most from the education we offer.</p> <p>It is recognised that potential students may not fall into the traditional 'entry tariff' route and progression will be closely monitored through indicators of student engagement, including attendance and academic performance. This will ensure that our students' academic engagement is outstanding in terms of both intensity and enthusiasm, by supporting strong habits of mathematical presentation, study skills and achievement in mathematics and other subjects. This is an entry route course with students expected to transfer to the BSc Mathematics (G100).</p> <p>Key Performance Indicators for the School of Mathematics:</p> <p>The School is a consistent 'top ten' scorer for student satisfaction, and is within the top 1/6<sup>th</sup> position for student satisfaction for 2014. For the BSc Mathematics 100% of students reported that they were "overall, satisfied with the quality of the course." It is anticipated that the small cohort starting the Foundation course will be provided equally excellent School support and on progression will be monitored to minimise any impact on continuation rates.</p> <p>The School is ranked overall 21 out of 67 listed institutions in the Times Guide. Good Honours for the past three years has averaged at 68% with 80% recorded in 2013/14. The 2013/14 figure included students who had started their education on a SCI foundation programme.</p> <p>Please see responses to BC3.1 for comments on employability prospects.</p>	
<b>BC1.2</b>	<b>Proposed Recruitment Strategy</b>	
<i>note BC1.2</i>	<p>The School has been reviewing engagement with students in the Widening Participation agenda, and recognises that the Foundation-Year programme is an important access route for students who may not have benefited from previous intensive support in the subject area. Therefore, this course will be linked to a new outreach Mathematics Summer School, starting in summer 2015.</p>	

	<p>The course is also expected to attract mature students. For example, an applicant may have relevant mathematical experience in work or in industry that would support his or her application, as an access route to degree-level study.</p> <p>Recruitment will be via UCAS. The course will be advertised through the web and UCAS, and will be included in relevant School Open Day presentations from summer 2015. The course will be included in the prospectus (with availability for “extra” in 2015 and brochures reviewed early summer 2015).</p> <p><b>Contextual criteria</b> We use contextual criteria for entry. Applicants must meet ONE of the following criteria:</p> <ul style="list-style-type: none"> <li>• Out of full time education for at least 3 years prior to application.</li> <li>• Not previously studied more than one science (Chemistry, Biology, Physics or Mathematics) at ‘A’ Level or equivalent.</li> <li>• Been in Local Authority Care.</li> <li>• Secondary School had 60% or fewer students achieving 5+ grade A*-C GCSEs (or equivalent) including English and Maths in 2012 - Data from Department of Education website: <a href="http://www.education.gov.uk/schools/performance/">www.education.gov.uk/schools/performance/</a></li> </ul> <p><b>Interview</b> The preferred option of the MTH Admissions Officer is for applicants will be invited on applicant days for interview before an offer is made to the course.</p>		
<b>BC1.3</b>	<b>Partnership and commercial sensitivity</b>		
<i>note BC1.3</i>	<b>Has this proposal, in outline, been approved by the Partnerships Office?</b>	<b>YES</b>	<b>YES</b>
		<b>NO</b>	
	<b>Please paste their comments below</b>		
	I can confirm that there are no issues from a partnerships perspective.  Sally Walker (email 26.11.2014)		

<b>BC2</b> <i>note BC2</i>	<b>MARKET RESEARCH</b>	Consult with Market Research team
<b>BC2.1</b>	<b>What other and type of institution offers identical and/or similar courses in the UK?</b>	

Institution	Course (s)	Guardian league table 2015 rank {mathematics subject area rank}
University of Birmingham	Mathematics with a Foundation	17 {7}
Keele University	Mathematics with a Foundation Year	41 {39}
University of Liverpool	Mathematics with a Foundation Year	45 {59}
University of Newcastle	Mathematics with a Foundation	28 {27}
Sussex University	Mathematics with a Foundation Year	43 {43}
University of East Anglia		14 {32}

Many HEIs in the UK offer a Foundation Year linked to MTH. The table above highlights a few.

**BC2.2 Are there any likely international competitors? (Please give brief details)**

No

**BC2.3 What is the annual number of applicants currently applying nationally for similar courses, and what are the entry requirements for these competitor courses?**  
*note BC2.3*

From UCAS web pages: Keele (“160 UCAS tariff points”); Newcastle & Birmingham (“14-19 Diploma (Advanced Diploma)”); Liverpool (entrance via a local college); Loughborough (“BBB to CCC typical offer & grade A maths GCSE required (or equivalent)”); Kent (“CCC in 3 A levels including A-level maths at C (or A-level Use of Maths at B) usually required.”); Plymouth (“180 points from a minimum of 2 GCE A-levels”); Sheffield (“ABB typical offer”); Sussex (“CC typical offer, including maths grade C.”); Swansea (“CCD Typical offer including maths”);

Whilst not directly related to the entry level for this course, G1 Mathematics data provided by UCAS supports steady demand for the BSc that students would be expected to transfer onto.

Mathematics accepts by year:

JACS Subject Line	Gender	2010	2011	2012	2013
G1 - Mathematics	Female	2,868	3,110	2,808	2,828
G1 - Mathematics	Male	4,408	4,522	4,503	4,857
<b>Grand Total</b>	<b>Total</b>	<b>7,276</b>	<b>7,632</b>	<b>7,311</b>	<b>7,685</b>

SCI Faculty has seen a growth in the number of applicants for similar foundation programmes over the past few years:

			2011/12	2012/13	2013/14
Grand Total	Total	FEMALE	209	203	220
Grand Total	Total	MALE	363	355	403
Grand Total	Total	TOTAL	572	558	623

<b>BC2.4</b>	<b>What is the evidence for current and future demands for the course from</b>	
	<ul style="list-style-type: none"> <li>• <b>potential students?</b></li> <li>• <b>employers (public services, private sector, the professions etc.)</b></li> </ul>	
	<p>The Faculty has been successfully recruiting to a Foundation Year programme for many years and students starting on the general SCI with a Foundation Year have transferred to the BSc MTH. Current ENV foundation year students have also expressed an interest, demonstrating that the programme is of interest across the subject areas.</p> <p>. Results from Clearing candidates who just missed our year-1 entry but for whom we had no Foundation Year to offer at that stage when they were keen to come to UEA. Employers' continuing demands from mathematically skilled graduates.</p>	
<b>BC2.5</b>	<b>Can current and projected demand be met from existing provision?</b>	
	<b>Nationally:</b>	Yes, the new course will meet the demand.
	<b>Regionally:</b>	Yes the new course will meet the demand.
<b>BC2.6</b>	<b>Where is/what are the competitive advantage(s) for UEA?</b>	
	<p>This course builds directly on our long-running Science with a Foundation Year programme. It also builds on the reputations of our school-specific Foundation Year programmes, introduced in September 2014. It will enhance the subject-specific provision at UEA in SCI.</p> <p>It will be possible to use the course positively in our OFFA agreement. It can be used competitively to demonstrate UEA's commitment to equality of opportunity and in Widening Participation.</p> <p>It will be clear to applicants how their first year of study can lead to an honours degree course. It will also allow for MTH-specific marketing to improve the visibility of the School of Mathematics at UEA to students, teachers and organisations.</p>	

<b>BC3</b> <i>note</i> <i>BC3</i>	<b>MARKET DEMAND AND RECRUITMENT</b>	Consult with Careers and Employability team
<b>BC3.1</b>	<b>What graduate career opportunities may be available?</b>	

	<p>MTH graduates are sought after within many professions and a degree qualification in the subject is known to offer many transferable skills. We have liaised with CCEN (Isla Hosking 24.10.14) and they support the view that doing a foundation year should not impact negatively on the graduates' career opportunities. The key factor will be the development of skills required and sought after by employers/post graduate education.</p> <p>CCEN have cautioned that some large graduate employers do look at UCAS tariff points (as well as 2:1 + degree level). Isla Hosking notes:</p> <p>The only negative aspect is that if Maths with a Foundation Year students have a lower UCAS tariff than average, it may be that they are slightly disadvantaged if they wish to apply to graduate training schemes offered by large graduate employers, as many of these schemes require a certain number of UCAS points (and a 2:1). However, these employers take on less than 10% of all graduates, and some will take into account extenuating circumstances (such as undiagnosed dyslexia, health problems or personal issues that impacted exam results) or widening participation backgrounds (such as non-traditional university entrants).</p> <p>On the other hand, Maths with a Foundation Year students could potentially use their extra year in Higher Education to engage more with work experience and extra-curricular activities than students on a 3-year course would have time for, which could potentially give them an advantage.</p> <p>SCI Faculty are currently implementing a strategy to develop the skills award {after pilot} linking to academic advisor support. We will ensure that this cohort is given equal early opportunity to work with CCEN and skills award to develop potential skills.</p> <p>MTH (G1) graduate employability has been improving with 2012-13 DLHE survey Graduate Prospects cited at 78.4% (against institutional average of 70.4%) and the School is aware of this metric as a key area for focus. Promoting an understanding of the kinds of employment opportunities that are available to MTH graduates will be developed through CCEN run and School run events.</p> <p><b>DHLE national survey 2012/13 – the wider picture for MTH graduates</b></p> <p>The average full-time mathematics graduates salary ranged from £17,140-£26,840 MTH graduates are more likely to enter further study (22.7%) compared to graduates from all subjects (12.4%) Over a third (37.7%) of MTH graduates in the UK were working as business, HR and finance professionals.</p> <p>The list of sample organisations that employ graduates with mathematical skills is extensive. The following areas are cited by maths careers (<a href="http://www.mathscareers.org.uk">www.mathscareers.org.uk</a>):</p> <p>Accountancy/Aerospace and Defence/Automotive/Biosciences/Business Support Services/Chemicals/Construction/Consultancy/Education/Engineering/Environment/Exploration Geophysics/Financial Services/Food &amp; Drink/Government/Healthcare/Insurance/IT &amp; Computing/Manufacturing/Media/Metals and Minerals/Operational Research/Pharmaceuticals/Recruitment/Academic Research/Science/Telecoms/Transport/Travel/Utilities.</p>
<b>BC3.2</b>	<b>Who (externally) has been consulted about the proposals (e.g. Professional Associations, employers' groups, PSRBs)?</b>

	The degree programme is not accredited at present. Please see BC3.1 for comments from CCEN. The School has contacted an external examiner for their viewpoint on the course (e-mail 5 December 2014, Oliver Jensen, Manchester University). He has confirmed that he can see the logic of the School introducing the programme and will be interested to learn about the progress of the plan in June 2015 {when he visits as external examiner}.
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<b>BC4</b> <i>note</i> BC4	<b>STUDENT NUMBERS AND TUITION FEES</b>	Consult with HOS, PLN, Faculty Dean, FFM			
<b>BC4.1</b>	<b>Student Numbers</b>				
<b>a</b>	<b>Proposed student target intake</b>	number			
<i>note</i> BC4.1a	<b>Full Time (Home/EU)</b>	11			
	<b>Full Time (International)</b>	N/A			
	<b>Part Time (Heads)</b>	N/A			
	<b>Distance Learning (Heads)</b>	N/A			
	<b>Minimum viable intake (full-time equivalents)</b>	11			
	<b>Maximum viable intake (full-time equivalents)</b>	25			
<b>b</b>	<b>Are the student numbers:</b>				
<i>note</i> BC4.1b	<b>a) available via redistribution within the School?</b> <i>Consult the Head of School</i>	<b>YES</b>	√	<b>NO</b>	
	<b>b) available via redistribution within the Faculty?</b> <i>Consult the Dean of Faculty</i>	<b>YES</b>		<b>NO</b>	√
	<b>c) additional numbers required?</b> <i>Consult the Planning Office (PLN)</i>	<b>YES</b>		<b>NO</b>	√
	<b>Please give a summary of how your answers to a), b) and c) above will be achieved.</b>				
	Foundation Year Programme to assist existing recruitment targets.				
<b>BC4.2</b>	<b>Tuition Fees</b>				
	<b>Please select the relevant fee schedule:</b>				
	<b>a) Standard Home/EU/International</b>	£9,000 per annum			
	<b>b) Full-cost</b> <i>Please consult with FFM</i>	0			
	<b>c) Other</b> <i>Please provide brief details</i>	0			

<b>BC5</b>	<b>IMPACT</b>				
<b>BC5.1</b> <i>note</i> BC5.1	<b>EQUALITY AND DIVERSITY</b>	Consult with Equality & Diversity Manager and			

		Widening Participation team	
<b>a</b>	<b>Does the course and/or School cover a subject area(s) which traditionally attract(s) a very specific or narrow student profile?</b>	<b>YES</b>	√
		<b>NO</b>	
<b>b</b>	<b>If yes, what steps will be taken to attract non-traditional students to the course/School? (Aspects to consider include: age, disability, ethnicity (home and international), gender, sexual orientation, religion and belief, and socio-economic group.)</b>		
	<p>The BSc and MMath degree programmes offered by MTH have traditionally attracted 18-year-olds with strong A-level grades. Typically applicants have always wanted to study maths exclusively. First-years typically form a mix of about 30-40% women to 60-70% men, (2014 intake: 24-76% women-men). This proposal addresses Widening Participation in helping able applicants, (who may start older or who hold non-traditional maths qualifications) to fulfil their degree potential from different prior experiences of life or study.</p> <p>The School is currently preparing for Athena Swan bronze award and has been critically reviewing possible strategy to increase non-traditional uptake of the subject and address the question of male/female ratio applications. Students on the Foundation Programme will benefit from any future action plan implemented.</p> <p>In 2013 the number of accepts on G1 Mathematics was 37% female and 63% male, nationally. The 2013 entry for UEA is similar to this national picture (33% female/67% male) but 2014 entry has seen predominantly male accepts (24%/76%). Analysis of Foundation Year (UEA) entry supports that this entry route encourages female applicants to study the subject. In 2013/14 40% of MTH foundation year students were female compared to the traditional entry level of 33%. In 2012/13 this figure was 50%. The School is not complacent but is encouraged by this data.</p> <p>The Faculty has contacted Helen Murdoch (Equality &amp; Diversity Manager) for some advice on this issue. Several proposals have been suggested that the School will consider within the Athena Swan review and the development of the course and promotional information including:</p> <ul style="list-style-type: none"> <li>• identifying success stories of recent female graduates from the School for use in recruitment marketing</li> <li>• monitoring destinations to include return to work examples that foundation students may embark upon</li> <li>• to complete short focus groups/mini-surveys to identify any gender or other equality issues for choosing the course</li> </ul> <p>These proposals will form part of the action plan for the recruitment and retention strategy for the course.</p> <p>MTH is actively involved in outreach, but will work with outreach department to identify any further activities that the School can support to generate interest from more urban areas across the UK.</p> <p>The course is considered accessible for mobility impaired students.</p>		
<b>c</b>	<b>Will students undertake placements/ come into direct contact with vulnerable groups as part of their study? If so, will a CRB be required?</b>		

	Not Applicable		
<b>BC 5.2</b> <i>note</i> BC5.2	<b>CURRENT STUDENTS AND/OR APPLICANTS</b>		
<b>a</b>	<b>Have School SSLCs been consulted regarding this proposal? If YES, what has been their input/response?</b>	<b>YES</b>	<b>YES</b>
		<b>NO</b>	
	<p>The SSLC consultation 26.11.14 yielded the following spoken and emailed views:</p> <p>"[I] personally did not do a foundation year; however, as I did not do further maths A level, I did find, and I have continued to find, that I am at a disadvantage [compared with] students that did. Despite getting a good grade in my first year I still feel the stress would [have] been decreased and my understanding enhanced if I had undertaken a foundation year, specially for mathematics";</p> <p>"I think that this is an excellent idea. as I think it will make the degree course much more accessible to students coming from the non-standard A-level route, because having the option to consolidate your previous study (which may be rusty or dated) while adjusting to being back at studying would be a good opportunity, and may make it seem more achievable to these students. Another thought was that if the foundation year is included in the degree is it covered by the student finance? If it is then this also would make it easier for students with other commitments to do a maths degree, as it would [be] a much simpler process to commit to a four-year programme which covers all, and organise the funding once and have it in place for the four years (this is a bit of a nightmare when you have dependents etc.) than a year and then a three year with uncertainty in the middle";</p> <p>"I think a course "Mathematics with a Foundation Year" would be a nice addition to the degree courses, I think it will make university mathematics more accessible";</p> <p>Other views expressed included a wish for more mathematics in the Foundation Year, and the importance of introducing early notions of different styles of proof. If time permits more differential equations would be desirable. In addition, a straw poll of 20 current MTH UG students emailed, yielded the views: From one first-year: "Seeing as I wanted to progress into a Mathematics degree from a Foundation in Computing Sciences, I think that this idea would be excellent. I don't think too many universities offer such a foundation degree. The only one I can think of would be Sussex. It would make it a lot easier to get onto the course and be excellent preparation for the Mathematics degree". Another first year spoke enthusiastically about the advantages of using material from Further Maths A level syllabus for the new module 'Advanced Maths'. From a finalist: "I think the course 'Mathematics with a Foundation Year' would be a good idea especially for students who have not done Further Maths A Level, or who didn't get as high grades as they thought they were going to. It also means that they would be fully prepared for the 3-year course after[wards], and would not feel that they know less than other students."</p>		
<b>b</b>	<b>Will any current students or applicants be affected by this proposal?</b>	<b>YES</b>	
		<b>NO</b> (go to 5.3)	√
<b>c</b>	<b>Evidence of consultation of current students and written consent obtained</b>		
	Please briefly describe what consultation has taken place and what responses there have been. Is there full support from all members of the relevant student cohort(s)?		
	There is no evidence of any opposition. Extra SSLC (and emailed written evidence from undergraduates) shows enthusiastic support for this proposal.		

<b>d</b>	<b>Informing applicants</b> What arrangements have been made for informing applicants who may be affected by any change(s)? Written notification, including advice about any alternative options that may be given, must be sent to applicants holding unconditional/conditional firm or conditional insurance offers.		
	N/A		
<b>BC5.3</b> <i>note</i> BC5.3	<b>ACADEMIC STAFF</b>	Consult with HOS, Dean of Faculty	
	<b>What is the impact / what are the resource implications of the proposal on academic staff?</b>		
<b>a</b>	<b>Please give an indicative number of <u>additional</u> teaching hours required within the school to deliver the new course/changes to the course in any one year</b>		32
<b>b</b>	<b>Is a new discipline or specialism being introduced that requires a new appointment?</b>	<b>YES</b>	
		<b>NO</b>	No*
<b>c</b>	<b>Are new appointments required to meet any additional hours?</b>	<b>YES</b>	
		<b>NO</b>	No
<b>d</b>	<b>If yes to either b or c above, how many of what type (eg Teaching and Scholarship, Teaching and Research) and at what level?</b>		
	N/A but see below.		
<b>e</b>	<b>What is the source of funding for new academic staff?</b>		
	Increased number of MTH students in year 1, and up to 3 further years per student. *Whilst the new module can in principle be delivered by existing staff within MTH this puts extra strain on teaching resources and students on this module would benefit from being taught by someone with experience of teaching at level 3. Such experience is available amongst some of the part-time ATS1 staff in MTH, but a small increase in the proportion of FTE would be required for them to deliver the new module. This has been discussed with the Senior Faculty Manager in SCI.		
<b>f</b>	<b>Are there any implications outside the sponsoring School/s e.g. service teaching, by other Schools of Studies?</b>		
	The presence of a new advanced maths module may add to the choices available to other schools' Foundation -Year students.		
<b>g</b>	<b>Are any other teaching adjustments required? For example, will new modules be introduced, other modules withdrawn or combined?</b>		
	One new 20 ucu module in advanced maths, (to supplement planned, unchanged, continuing level-3 modules "Basic Mathematics I" and "Basic Mathematics II").		
<b>BC5.4</b> <i>note</i> BC5.4	<b>COURSE RATIONALISATION</b>	Consult with HOS, Dean of relevant Faculties, PLN	
<b>a</b>	<b>DO ANY SIMILAR COURSES ALREADY EXIST AT UEA?</b>	<b>YES</b>	
		<b>NO</b>	No
	<b>If YES, please specify Course name, UCAS Code(s) / Course codes</b>		
<b>b</b>	<b>IS/ARE ANY COURSE(S) TO BE CLOSED TO NEW APPLICANTS AS PART OF THIS PROPOSAL?</b>	<b>YES</b>	

		<b>NO</b>	No
	<b>If YES, please specify Course name, UCAS Code(s) / Course codes and date from which course(s) is to be withdrawn?</b>		
<b>c</b>	<b>Please give an indicative number of teaching hours <u>released</u> within the school in any one year by the closure of the courses listed above</b>		

<b>BC6</b>	<b>PHYSICAL RESOURCES</b>		
<b>BC6.1</b> <i>note</i> <i>BC6.1</i>	<b>What new or additional facilities and /or equipment are required for the delivery of this course?</b>		
<b>a</b>	<b>Classroom and study facilities</b>	32 hours contact, in seminar-size rooms	
<b>b</b>	<b>Computer equipment</b>	25 students-worth	
<b>c</b>	<b>Other equipment</b>	N/A	
<b>d</b>	<b>Consumables</b>	Printer ink and paper.	
<b>BC6.2</b>	<b>What additional books/journals/electronic resources, other than those already available, will be required year by year until steady state is reached?</b>		
	Minimal extra provision of up-to-date undergraduate texts and e-books from Library, as this is currently well supported for existing modules. The Library has confirmed that they currently support other foundation courses and this includes the provision of foundation MTH texts for 1 <sup>st</sup> year Science students. (R Henderson 21.11.14) The School does not anticipate a large increase in requirement for additional books/journals/electronic resources to support the programme as the existing provision is considered suitable.		
<b>BC6.3</b>	<b>Are there any other special arrangements on which this course proposal will depend? (E.g. placements, year abroad).</b>	<b>YES</b>	
		<b>NO</b>	No
	<b>If Yes, please give details of likely costs/whether appropriate agreements are in place/have to be drawn up?</b>		
<b>BC6.4</b>	<b>Are there any start-up costs (e.g. any initial publicity and promotion?)</b>	<b>YES</b>	<b>YES</b>
		<b>NO</b>	
	<b>If yes, please give details:</b>		
	Flyers at sixth-form MTH Summer School; extra provision of admissions advertising materials; space in MTH Brochure and UEA Prospectus.  SCI marketing team have been consulted and are aware of this proposal.		

<b>BC7</b> <i>note</i> BC7	<b>IMPACT / RESOURCE IMPLICATIONS FOR OTHER UNIVERSITY SERVICES</b>	
COMPLETION OF THIS SECTION TO BE COORDINATED BY LEARNING AND TEACHING SERVICE (LTS) COORDINATOR		
Please circulate Parts 1 & 2 to the following for their comments (if any). Comments to be returned within 10 working days.		
<i>note</i> BC7	<b>What is the impact of the proposal on support staff and resources in the office for which you are responsible?</b>	
<b>Date of circulation:</b>	10.12.2014	
BC7.1	Dean of Students (DOS)	
	I note that it is anticipated that the new course will attract mature students who are heavy users of the services provided by DOS. Although the likely intake is modest in number, any additional students add to the pressure on our services.	
BC7.2	Deputy Dean of Students (accommodation)	
	First year students who live more than 12 miles from the University continue to be guaranteed University accommodation. Should the course attract locally-based mature students, they are less likely to require University accommodation than school leavers.	
BC7.3	Director of Information Services (ISD)	
	In light of the further information provided by the Course Proposer, I have no comments to make. <b>Info provided in relation to B6: MTH shares with BIO an existing computer laboratory of 40 terminals. This current provision supports the undergraduate teaching needs of MTH, therefore no additional computer machines or software will be needed.</b>	
BC7.4	Director of Library Services (LIB)	
	As the new foundation year proposed comprises mainly existing modules we should be able to provide appropriate books for the small student numbers involved.  There is no mention of new journal titles being required so we assume no additional expenditure is required in this area. It should be noted that the future acquisition of any new journal titles for this course would be more challenging as our journals budget is effectively capped because publisher inflation continues to exceed the headline rate of inflation (RPI).	
BC7.5	Careers Manager (CCEN)	
	No comments received.	
BC7.6	Head of Learning & Teaching Service (LTS)	

	No comments received.
BC7.7	Head of Admissions (ARM)
	Fully support this proposal, no other comments.
BC7.8	Director of Planning Office (PLN)
	No comments received.
BC7.9	Any other service or department
<i>note</i> BC7.9	

<b>BC8</b>	<b>ADDITIONAL COMMENTS</b>	
COMPLETION OF THIS SECTION TO BE COORDINATED BY LEARNING AND TEACHING SERVICE (LTS) COORDINATOR		
Please circulate Parts 1 & 2 to the following for their comments (if any). Comments to be returned within 10 working days.		
<i>note</i> BC8	<b>Is there anything further to add to the proposal from the perspective of your service and expertise?</b>	
<b>Date of circulation:</b>	10.12.14	
BC8.1	Market Research Manager (on Section BC2)	
	Have discussed with colleagues in the BIU and we have no specific comment to make. The consensus is that this runs in line with the wider Faculty foundation offering.	
BC8.2	Careers Manager (on Section BC3)	
	No comments received.	
BC8.3	Equality & Diversity Manager (on Section BC5.1)	
	I fully support the School's initiative and will work with them, on-going, to identify ways of increasing the range of non-traditional students able to access a degree in Maths through this route. The section on equality, above, demonstrates a good awareness of potential issues and solutions. I am sure this will open the door to many talented students while at the same time, helping the University identify broader markets for its courses.	
BC8.4	Director of Planning Office (PLN) (on full Business Case)	
	No comments received.	
BC8.5	Faculty Finance Manager (on full Business Case)	

<i>note</i> BC8.5	Any additional teaching costs should be offset by increased fee income and marketing costs for flyers etc. are likely to be small and therefore absorbed within existing school budgets.
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<b>BC9</b>	<b>PROPOSER'S RESPONSE TO COMMENTS IN BC7 &amp; BC8 ABOVE</b>
<i>note</i> BC9	<p>BC7.1: points noted as an institutional concern -- we are grateful for the continuing support of the wider University divisions to our MTH students.</p> <p>BC7.4: We confirm that no extra journals will be needed for this degree course.</p> <p>BC7 and BC8: We are grateful for the positive comments and support for this proposal.</p>

## UEA LEARNING &amp; TEACHING SERVICE

## FULL COURSE PROPOSAL

## Part 3 ACADEMIC CASE (including Programme Specification)

AC1	COURSE MANAGEMENT INFORMATION				
AC1.1	REGULATORY FRAMEWORK (please tick all that apply)				
	Undergraduate Regulations (including Integrated Masters)			yes	
	Postgraduate Taught Regulations				
	Graduate Diplomas				
	PGCE				
AC1.2a	Is the course as a whole assessed on a pass/fail basis?	YES		NO	x
AC1.2b	Are any modules assessed on a pass/fail basis?	YES		NO	x
AC1.2c	If so, how many modules and what is the credit volume for each module?				
	A mix of assessments: 100% CW for current MTHB0001A, (20ucu); 20% CW + 80% exam for current MTHB0002B, (20ucu); 20% CW + 80% exam for new module "Advanced Mathematics" MTH***, (20ucu). CW includes formative and summative elements. Also similar, mixed assessments in 60 further credits of options at level 3.				

AC2 <i>note AC2.1</i>	YEAR WEIGHTINGS AND PROGRESSION REQUIREMENTS (For undergraduate or integrated masters courses only)				
	Please select only from the permitted options - see UG/PGT regulations				
Stage <i>Note AC2.2</i>	Level	Year of course	Weightings	Progression requirement	Exit Award <i>Note AC2.3</i>
Stage 0	Level 3	1	0	Pass 120 credits at level 3, including at least 40% in MTHB0001A MTHB0002B & "Advanced Maths"	Transcript: no award
Stage 1	Level 4	2	0	Pass 120 credits at level 4.	Certificate of HE
Stage 2	Level 5	3	40%	Pass a minimum of 100 credits at level 5 and no more than 20	Diploma of HE

				credits at level 4.	
Year Abroad / in Industry					
Stage 3	Level 6	4	60%	Pass a minimum of 90 credits at level 6 & no more than 30 credits at level 5, none at level 4.	BSc
Stage M	Level 7				

<b>AC3</b>	<b>BOARD OF EXAMINERS</b>				
AC3.1	Is there an existing Board of Examiners?	YES	Y	NO	
AC3.2a	If YES, which existing board will be responsible for the course?	Mathematics			
AC3.2b	If NO, please enter details for new board of examiners				
	Are any new external examiner(s) required?	YES		NO	No
AC3.3b	If yes, how many?				

<b>PS</b>	<b>PROGRAMME SPECIFICATION</b>
<i>note PS</i>	This part of the form will serve a dual purpose. Please read the guidance note carefully before completing

## PROGRAMME SPECIFICATION FOR AN AWARD OF THE UNIVERSITY OF EAST ANGLIA

Course name	Route code <i>note S2b</i>	Year
Mathematics with a Foundation Year		2015-16

**NOTE:** Whilst the University will make every effort to offer the modules listed, changes may sometimes have to be made for reasons outside the University's control (e.g. illness of a member of staff) or because of low enrolment or sabbatical leave. Where this is the case, the University will endeavour to inform students.

<b>PS1 COURSE PROFILE</b>					<i>note PS1</i>
<b>YEAR 1 profile</b>				<b>Level</b>	This column will be deleted prior to publication
				3	
<b>Module Code (TBA if not known)</b>	<b>Compulsory? - or name of Option range</b>	<b>Credits</b>	<b>Module Title</b>	<b>Teaching period, eg Sem 1, Year-long</b>	<b>New / amended / existing</b>
TBA	Compulsory	20	ADVANCED MATHEMATICS	Sem 2	New
MTHB0001A	Compulsory	20	BASIC MATHEMATICS I	Sem 1	Existing
MTHB0002B	Compulsory	20	BASIC MATHEMATICS II	Sem 2	Existing
CHE-0011A	Options Range A	20	INTRODUCTORY PHYSICS	Sem 1	Existing
CHE-0010B,	Options Range A	20	FURTHER PHYSICS	Sem 2	Existing
CHE-0004A	Options Range A	20	INTRODUCTORY CHEMISTRY	Sem 1	Existing
CHE-0003B	Options Range A	20	FURTHER CHEMISTRY	Sem 2	Existing
BIO-0002A	Options Range A	20	INTRODUCTORY BIOLOGY	Sem 1	Existing
BIO-0001B,	Options Range A	20	FURTHER BIOLOGY	Sem 2	Existing
CMP-0002A,	Options Range A	20	FOUNDATIONS OF COMPUTING	Sem 1	Existing

CMP-0005B	Options Range A	20	INTRODUCTORY PROGRAMMING	Sem 2	Existing
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<b>PS1 COURSE PROFILE - <i>continued</i></b>					<i>note PS1</i>
<b>YEAR 2 profile</b>				<b>Level</b>	This column will be deleted prior to publication
				4	
<b>Module Code (TBA if not known)</b>	<b>Compulsory? - or name of Option range</b>	<b>Credits</b>	<b>Module Title</b>	<b>Teaching period, eg Sem 1, Year-long</b>	<b>New / amended / existing</b>
MTHA4001Y	Compulsory	20	Sets, numbers and probability	Year-long	existing
MTHA4002Y	Compulsory	20	Linear algebra	Year-long	existing
MTHA4003Y	Compulsory	20	Real analysis	Year-long	existing
MTHA4004Y	Compulsory	20	Mathematical problem solving, mechanics and modelling	Year-long	existing
MTHA4005Y	Compulsory	40	Calculus and multi-variable calculus	Year-long	existing

<b>PS1 COURSE PROFILE - <i>continued</i></b>					<i>note PS1</i>
<b>YEAR 3 profile</b>				<b>Level</b>	This column will be deleted prior to publication
				5	
<b>Module Code (TBA if not known)</b>	<b>Compulsory? - or name of Option range</b>	<b>Credits</b>	<b>Module Title</b>	<b>Teaching period, eg Sem 1, Year-long</b>	<b>New / amended / existing</b>
MTHA5001Y	Compulsory	20	Analysis	Year-long	existing
MTHA5002Y	Compulsory	20	Fluid dynamics – theory and computation	Year-long	existing
MTHA5003Y	Compulsory	20	Algebra	Year-long	existing
MTHA5004Y	Compulsory	20	Differential equations and applied methods	Year-long	existing
CMP5034A	Options A	20	Mathematical Statistics	Sem1	existing
MTHA5005Y	Options A	20	Mathematics Project	Year-long	existing
MTHF5001A	Options A	20	Elementary Number Theory and Quantum Mechanics	Sem1	existing
MTHF5012Y	Options A	20	Elementary Number Theory and Combinations	Year-long	existing
MTHF5013Y	Options A	20	Elementary Number Theory and Mathematical Modelling	Year-long	existing
MTHF5014Y	Options A	20	Quantum Mechanics and Combinatorics	Year-long	existing

MTHF5015Y	Options A	20	QUANTUM MECHANICS AND MATHEMATICAL MODELLING	Year-long	existing
MTHF5016B	Options A	20	COMBINATORICS AND MATHEMATICAL MODELLING	Sem2	existing
MTHF5017Y	Options A	40	TOPICS IN MATHEMATICS	Year-long	existing
CMP5017B	Options B	20	APPLIED STATISTICS A	Sem2	existing
CMP5033A	Options B	20	SOUND AND IMAGE 1	Sem2	existing
ENV5008A	Options B	20	METEROLOGY 1	Sem2	existing
NBS4001Y	Options B	20	INTRODUCTION TO FINANCIAL AND MANAGEMENT ACCOUNTING	Year-long	existing
NBS4002Y	Options B	20	INTRODUCTION TO BUSINESS	Year-long	existing

<b>PS1 COURSE PROFILE - <i>continued</i></b>					<i>note PS1</i>
<b>YEAR 4 profile</b>				<b>Level</b>	This column will be deleted prior to publication
				6	
<b>Module Code (TBA if not known)</b>	<b>Compulsory? - or name of Option range</b>	<b>Credits</b>	<b>Module Title</b>	<b>Teaching period, eg Sem 1, Year-long</b>	<b>New / amended / existing</b>
MTHE6002A	Options A,B,C	20	FREE SURFACE FLOWS	SEM1	Existing
MTHE6003B	Options A,B,C	20	SET THEORY	SEM2	Existing
MTHE6004A	Options A,B,C	20	GALOIS THEORY	SEM1	Existing
MTHE6005A	Options A,B,C	20	GRAPH THEORY	SEM1	Existing
MTHE6006A	Options A,B,C	20	ASYMPTOTIC ANALYSIS	SEM2	Existing
MTHE6007B	Options A,B,C	20	DYNAMICAL OCEANOGRAPHY	SEM2	Existing
MTHE6011B	Options A,B,C	20	SEMIGROUP THEORY	SEM2	Existing
MTHE6012B	Options A,B,C	20	INTRODUCTION TO NUMERICAL ANALYSIS	SEM2	Existing
MTHE6013A	Options A,B,C	20	FINANCIAL MATHEMATICS	SEM1	Existing
MTHE6001A	Options B and C	20	HISTORY OF MATHEMATICS	SEM1	Existing

MTH6002A	Options B and C	20	THE LEARNING & TEACHING OF MATHEMATICS	SEM1	Existing
MTHA6005Y	Options C	20	MATHEMATICS PROJECT	Year-long	Existing
MTHF5011A	Options C	20	ELEMENTARY NUMBER THEORY AND QUANTUM MECHANICS	SEM1	Existing
MTHF5012Y	Options C	20	ELEMENTARY NUMBER THEORY AND COMBINATORICS	Year-long	Existing
MTHF5013Y	Options C	20	ELEMENTARY NUMBER THEORY AND MATHEMATICAL MODELLING	Year-long	Existing
MTHF5014Y	Options C	20	QUANTUM MECHANICS AND COMBINATOR	Year-long	Existing
MTHF5015Y	Options C	20	QUANTUM MECHANICS AND MATHEMATICAL MODELLING	Year-long	Existing
MTHF5016B	Options C	20	COMBINATORICS AND MATHEMATICAL MODELLING	SEM2	Existing
MTHF5017Y	Options C	20	TOPICS IN MATHEMATICS	Year-long	Existing
CMP5017B	Options D	20	APPLIED STATISTICS A	SEM2	Existing
CMP5020B	Options D	20	PROGRAMMING FOR NON-SPECIALISTS	SEM2	Existing
CMP5033A	Options D	20	SOUND AND IMAGE 1	SEM1	Existing
CMP6004A	Options D	20	ADVANCED STATISTICS	SEM1	Existing
ENV5008A	Options D	20	METEOROLOGY I	SEM1	Existing
ENV5009B	Options D	20	METEOROLOGY II	SEM2	Existing
ENV5016A	Options D	20	OCEAN CIRCULATION	SEM1	Existing

NAT5001A	Options D	20	ASTROPHYSICS WITH ADVANCED TOPICS	SEM1	Existing
NBS5001B	Options D	20	ACCOUNTING FOR NON-SPECIALISTS	SEM2	Existing

<b>PS2 MAPPING LEARNING OUTCOMES</b>	<i>note PS2</i>
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Mapping learning outcomes – please list learning outcomes and enter module code against assessment type <b>YEAR 1 learning outcomes</b>	Assessment type									
	Essay	Lab report	Course test	Exam	Project / Dissertation/ Report	Oral Presentation	Assessment of practice	Summative & formative CW feedback	Other	
Develop coherent written persuasive mathematical demonstrations using reasoning and supporting calculations.				MTHB002B				MTHB002B		
Develop coherent mathematical reasoning including proofs of simple theorems.				MTH*** *****				MTH*** *****		
Learning to handle numbers, variables, notation, sets in various mathematical contexts.								MTHB001A		
Accurate manipulations in algebra and number handling.				MTHB002B,MTH*** ****				MTH*** *****		
<b>Other:</b> please give details										



**PS2 MAPPING LEARNING OUTCOMES - continued**

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type <b>YEAR 2 learning outcomes</b>	Assessment type								
	Essay	Lab report	Course test	Exam	Project / Dissertation/ Report	Oral Presentation	Assessment of practice	Other	Other
demonstrate a reasonable understanding of the main body of knowledge.				All modules					All modules
demonstrate a good level of skill in calculation and manipulation of the material within this body of knowledge.				All modules					All modules
apply a range of concepts and principles in loosely-defined contexts, showing effective judgment in the selection and application of tools and techniques.				All modules					All modules
develop and evaluate logical arguments.				All modules					All modules
demonstrate skill in abstracting the essentials of problems, formulating them mathematically and obtaining solutions by appropriate methods.				All modules					All modules
present arguments and conclusions effectively and accurately.				All modules					All modules
demonstrate appropriate general skills.				All modules					All modules
demonstrate the ability to work professionally with a degree of independence, seeking assistance when needed.				All modules					All modules
<b>Other:</b> please give details									

**PS2 MAPPING LEARNING OUTCOMES - continued**

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type <b>YEAR 3 learning outcomes</b>	Assessment type									
	Essay	Lab report	Course test	Exam	Project / Dissertation/ Report	Oral Presentation	Assessment of practice	Other: project	Other: CW exercise	
demonstrate a reasonable understanding of the main body of know-ledge.				All modules				MTHA5005Y	All modules	
demonstrate a good level of skill in calculation and manipulation of the material within this body of knowledge.				All modules					All modules	
apply a range of concepts and principles in loosely-defined contexts, showing effective judgment in the selection and application of tools and techniques.				All modules					All modules	
develop and evaluate logical arguments.				All modules					All modules	
demonstrate skill in abstracting the essentials of problems, formula-ting them mathematically and obtaining solutions by appropriate methods.				All modules				MTHA5005Y	All modules	
present arguments and conclusions effectively and accurately.				All modules				MTHA5005Y	All modules	
demonstrate appropriate general skills.				All modules				MTHA5005Y	All modules	
demonstrate the ability to work professionally with a degree of independence, seeking assistance when needed.				All modules				MTHA5005Y	All modules	
<b>Other:</b> please give details										

**PS2 MAPPING LEARNING OUTCOMES - continued**

note PS2

Mapping learning outcomes – please list learning outcomes and enter module code against assessment type <b>YEAR 4 learning outcomes</b>	Assessment type								
	Essay	Lab report	Course test	Exam	Project / Dissertation/ Report	Oral Presentation	Assessment of practice	Other Project	Other CW exercises
demonstrate a reasonable understanding of the main body of knowledge.	MTHA 6001A			All modules				MTHA 6005Y	All modules
demonstrate a good level of skill in calculation and manipulation of the material within this body of knowledge.				All modules					All modules
apply a range of concepts and principles in loosely-defined contexts, showing effective judgment in the selection and application of tools and techniques.	MTHA 6001A			All modules					All modules
develop and evaluate logical arguments.				All modules					All modules
demonstrate skill in abstracting the essentials of problems, formulating them mathematically and obtaining solutions by appropriate methods.				All modules				MTHA 6005Y	All modules
present arguments and conclusions effectively and accurately.	MTHA 6001A			All modules				MTHA 6005Y	All modules
demonstrate appropriate general skills.	MTHA 6001A			All modules				MTHA 6005Y	All modules
demonstrate the ability to work professionally with a degree of independence, seeking assistance when needed.	MTHA 6001A			All modules				MTHA 6005Y	All modules



<b>PS3 PROGRAMME COHERENCE AND FEEDBACK CYCLES</b>		<i>note PS3</i>
<b>PS3.1 learning progression</b>		
How will progression in terms of skills, knowledge and understanding be reflected in the programme between modules in any one year and across the years as students progress through their course of study?		<i>note PS3.1</i>
	<p>In the Foundation Year: In semester 1, students will learn through lecture experience and coursework in MTHB0001A, various ways of reasoning mathematically. Feedback to students helps them set out written work persuasively. Students learn to handle appropriate notations, linking statements and supportive evidence, such as labelled diagrams and citations of standard theorems from lecture notes. In semester 2, the more advanced material on vectors and integral calculus in MTHB0002B builds on the differential calculus mastered in semester 1. All of this forms the foundation of higher mathematics. The most advanced material will build further on this, and will be taught rather than lectured in small-group settings. (Material is selected from the A-level "Further Maths" syllabus.) Students will stretch and extend their facility in problem-solving and the use of notations (beyond those presented in an exercise), and will build an appreciation of proof. Examples are: (i) supplying rigour in the proof of a simple theorem; (ii) coupling a chain of ideas to solve a class of exercises, (not just calculating answers to specific exercises). We expect the study of non-maths modules in the Foundation Year to be also vital to a student's mathematical maturity: CW timekeeping, acting on formative CW feedback, report-writing, awareness of scientific contexts, including the use of (and limits of) mathematical models in science.</p>	
<b>PS3.2 feedback cycle</b>		
Please explain how assessments and feedback / feed forward support the coherence of the programme. Comment on number and types of assessment, both formative and summative; the types and format of feedback students will receive; and their sequencing. How will assessments and feedback impact on subsequent modules?		<i>note PS3.2</i>
	<p>MTHB0001A is CW-only: the feedback is partly via return of comments on marked scripts. (There are formative CWs, 2 summative courseworks each weighted 25%, and a course test weighted 50%.) There are also model solutions, reinforced by the lecturer's written comments about common errors on Portal and in class. These are given at the time of the return of marked scripts. Model solutions are posted on Portal (for students to download) or as paper copies in class. Each set of solutions has its availability timed to coincide with the return of CW, usually within 2 weeks.</p> <p>There is a similar pattern of feedback for MTHB0002B (formative and 2 summative CWs, each worth 10%, and a 2-hour exam, worth 80%). The CW is similarly marked for feedback on style and content as well as for the mark. Before each deadline a seminar covers exercises on those topics for which CW is set, so students get initial practice with the lecturer's help, before doing independent CW with fresh exercises.</p> <p>There will be a similar assessment pattern for "Advanced Mathematics": formative CWs, at least 2 summative CWs (together weighted 20%), and an exam (80%). For this module there will be a smaller class of 11-25 students, who will gain from more 1-1 contact with the lecturer. All the feedback reinforces a set of common themes: clear exposition of written material; stating assumptions; declaring the theorems / rules being used; properly laid out algebra / numerical steps, symbols and words showing correct reasoning.</p>	

Marks from first semester MTHB0001A coursework, and the Advanced Maths CWs marks and feedback, will inform the student (and adviser) about academic progress to date, and the prospects and readiness to succeed with higher-level mathematics in year 2.

<b>PS4</b>	<b>EXAMINATIONS</b>	<i>note PS4</i>	
		<b>Written</b>	<b>Practical (e.g. OSCES and OSPES)</b>
How many modules will include an exam element?	2 MTH + 1 or more non-MTH.		
How many hours of exams are there in Stage 0? (if applicable)	At least 2+2 hours; up to 8.		
How many hours of exams are there in Stage 1?	3+2+2+2+2=11.		
How many hours of exams are there in Stage 2?	At least 4X3=12; up to 16.		
How many hours of exams are there in Stage 3?	At least 4X3=12; up to 6X3=18.		
How many hours of exams are there in Stage 4? (if applicable)	NA		
How many hours of exams are there in Stage 5? (if applicable)	NA		
How many hours does the programme (as a whole) include?	At least 39 hours; up to 53 hours.		

<b>PS5</b>	<b>EQUALITY &amp; WIDENING PARTICIPATION</b>	<i>note PS5</i>	
PS5.1	How do the admissions criteria specifically for this course ensure equality of opportunity for all applicants?		
	Admissions procedures, including any applicant interviewing, will follow the regulations and guidelines set by UEA.		
PS5.2	What steps have been taken to ensure an inclusive curriculum?		
	Curriculum design of new module will appeal to a wide audience of maths students, and will only assume appropriate prior knowledge or level of achievement in mathematics.		
PS5.3	In what ways do learning and teaching and assessment methods ensure inclusivity, reasonable adjustment and equality of opportunity?		
	To help students who have not studied for a while (possibly several years) the emphasis is on easier material, assessed by 100% coursework, in the Autumn. This changes for higher level material to more weighting on exam assessments in the Spring maths modules. Seminar and class activities will support the ultimate demands of exams and will provide feedback through small-group learning for the more advanced mathematics.		

<b>PS6</b>	<b>EMPLOYABILITY</b>	<i>note PS6</i>	
	How is employability embedded into the delivery of the course?		

	<p>Transferable skills begin in the foundation year with enhanced problem-solving, reasoning, addressing of assumptions, clarity of exposition in coursework, class discussion and exams. Later years build on these skills, developing applied numeracy and IT skills, including opportunities for project work: this includes poster presentation, and oral presentation of the project. Through the help of advisers, all undergraduate mathematicians keep up-to-date CVs and attend careers events from the start of their degree programmes.</p>
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1

<b>AC4</b>	<b>MODULE OUTLINES FOR EXISTING COMPULSORY MODULES</b>			
note AC4	Number of existing COMPULSORY modules	Twelve		
	Module outlines attached? (as Appendix 1 to this form)	YES	Y	NO

<b>AC5</b>	<b>MINOR CHANGES TO EXISTING MODULES</b>		
note AC5	Please list all existing modules, compulsory and optional, to which you are proposing minor changes		
Module Code	Module Title	Minor changes proposed	

<b>AC6</b>	<b>NEW MODULES</b>	
note AC6	How many new modules are being proposed?	One.
Please complete a table AC6.x for each proposed new module		

<b>AC6.1</b>	<b>NEW MODULE</b>			
Module Title	Advanced Mathematics			
Level	3			
Credit Value	20			
Teaching period, eg Semester 1, Year-long	Semester 2			
Likely Module Organiser	Dr M J Cooker			
Module Type (eg EX/CW/WW/PR etc)	WW			
Does the Module include an Exam? Yes/No	Yes	How long will the exam be? (ie 1, 2 3 hours)	2	
Module Marking Scheme (Please tick as appropriate)	Pass/Fail?		Percentage marking?	Yes

Proposed Module Code	MTH*TBC*
Module Delivery (eg distance-learning campus based, work placement)	Campus based classes
Brief Description	Hyperbolic functions, simple matrices and determinants, proof by induction, the vector cross-product. Other topics will extend the material in Basic Maths I and II: Maclaurin series (applying differential calculus of the Autumn) and first-order ODEs (applying integral calculus of the spring).
Aims / learning outcomes	To prepare students for degree-level mathematical study, so that students can express themselves clearly and accurately in written reasoning, using correctly manipulated and ordered mathematical statements.
Key Reading (2-5 key texts or resources for targeted Library expenditure/purchase)	From Further Mathematics A-level literature: 1. J.Olive "Maths: a student's survival guide", CUP, 2010. 2. NRICH (a University of Cambridge resource) website, including resources for Further Maths A-level and STEP paper resources: <a href="http://nrich.maths.org/10047">http://nrich.maths.org/10047</a> 3. L.Bostock & S.Chandler "Core Maths for A-level", Stanley Thornes, 2009. 4. A.Croft and R.Davison "Foundation Mathematics", Prentice Hall, 2010. 5. K.Houston "How to Think Like a Mathematician", CUP '09

\*\*\*\*Please copy and paste the above table for additional new modules\*\*\*\*

<b>AC 7</b> <i>note</i> AC7	<b>DEFINED CHOICE</b>
How do you envisage 'Defined Choice' working for the course in question? Please specify, for each year of the course, defined choice within the 3 categories of: <ul style="list-style-type: none"> <li>• Programme-specific choice</li> <li>• Enrichment and Employment modules (EEC)</li> <li>• Language choice</li> </ul>	
For the Foundation year: Programme-specific choice: 60 ucu of non-MTH modules at level-3 (BIM) from those SCI modules also taught for Foundation Year programmes, in BIO, CHE (not their mathematics modules), CMP, and ENV. It will also enrich the experience: depending on a student's pre-UEA background he or she will be able to complement current knowledge/qualifications at an appropriate level. We do not envisage a need for language provision within the degree programme.  For Year 2 – no defined choice. For Years 3 and 4: Same as the defined choices for years 2 and 3 of BSc Mathematics Programme.	

<b>AC8</b> <i>note</i> AC8	<b>JOINT COURSES</b>		
	<b>Is the proposed course a joint course?</b>	<b>YES</b>	
		<b>NO</b>	No
	<b>If YES, how will the student experience be managed?</b>		

<b>AC9</b>	<b>COMMENTS/FEEDBACK FROM EXTERNAL PROFESSIONALS/ BODIES</b>		
<i>note</i> AC9	<b>Please provide a summary of external professional feedback received. Append full reports as Appendix 2</b>		
	N/A		
<i>note</i> AC9	<b>Please provide a summary of Professional, Statutory or Regulatory Body (PSRB) approval, if appropriate. Append any relevant documents as Appendix 3</b>		
	N/A		

<b>AC10</b>	<b>COMMENTS ON ACADEMIC CASE AND PROGRAMME SPECIFICATION</b>		
COMPLETION OF THIS SECTION TO BE COORDINATED BY LEARNING AND TEACHING SERVICE (LTS) COORDINATOR			
<i>note</i> AC10	<b>Please circulate Parts 1, 3 &amp; 4 to the following for their additional comments (if any). Comments to be returned to proposer within 10 working days.</b>		
	<b>NB these comments should focus on the <i>ACADEMIC CONTENT</i> of the proposal</b>		

<b>Date of circulation:</b>	
AC10.1	Careers Manager (CCEN)
No comment.	
AC10.2	Learning & Teaching Service (LTS) Manager (UG or PGT, as appropriate)
In AC2, under BIM students have to pass all modules to progress so the progress requirements could just be 'pass all level 3 modules'.	
AC10.2	Equality & Diversity Manager (PPE)
No comment.	

<b>AC11</b>	<b>PROPOSER'S RESPONSE TO COMMENTS IN AC9 &amp; AC10 ABOVE</b>
<i>note AC11</i>	AC10.2: Agreed that the progress requirement is 'pass all level 3 modules'.

**FULL COURSE PROPOSAL****Part 4 KEY INFORMATION SET (KIS) DATA**

<b>KIS</b>	<b>KEY INFORMATION SET data (undergraduate courses only)</b>						<i>Note KIS</i>
<b>KIS1</b>	<b>Quantitative KIS data</b>						<i>Note KIS1</i>
		Year 1	Year 2	Year 3	Year 4	Year 5	
1.1	Percentage of assessment by written exams	35-47	55	80	80	-	
1.2	Percentage of assessment by practical exams	0--20	0	0	0	-	
1.3	Percentage of assessment by coursework	30--50	45	20	20	-	
1.4	Percentage of time in scheduled learning and teaching activities	About 27	26	27	21	-	
1.5	Percentage of time in guided independent study	About 73	74	73	79	-	
1.6	Percentage of time on placements	0	0	0	0	-	
<b>KIS2</b>	<b>Professional Accreditation</b>						<i>Note KIS2</i>
2.1	Name of accrediting body (if applicable)						
	N/A						
2.2	Please give details, including any memberships, exemptions etc that the award confers. Please also give accrediting body website URL.						
	N/A						
2.3	Is the accreditation dependent on specific module choices? If so, please include URL of web pages where these details are outlined.						
	N/A						

**FULL COURSE PROPOSAL****Part 5 APPROVALS AND NOTIFICATION****APPROVALS***Note AP*

<b>THIS SECTION WILL BE COORDINATED BY THE SECRETARY TO YOUR FACULTY TEACHING AND LEARNING QUALITY COMMITTEE (FLTQC)</b>				
<b>AP1</b>	<b>APPROVAL OF THE BUSINESS CASE</b>			
	<b>APPROVAL/SIGNATURES</b>	<b>Name</b>	<b>Signature/ evidence of approval</b>	<b>Date</b>
AP1.1	School Director of Learning, Teaching and Quality	Emilian Parau	E.Parau	18/02/15
AP1.2	Head of School (on behalf of School Board)	<p><b>From:</b> David Evans (MTH)  <b>Sent:</b> Wednesday, February 18, 2015 10:28 AM  <b>To:</b> Jean Whiting (LTS)  <b>Cc:</b> David Evans (MTH)  <b>Subject:</b> Re: Full Course Proposal - BEng and MEng Energy Engineering etc</p> <p>Dear Jean, This has my approval (for both sections).</p> <p>Best wishes</p> <p>David</p>		
AP1.3	Dean of Faculty (on behalf of Faculty Executive)	Philip Gilmartin		4/3/15
AP1.4	LTC (if relevant)			
AP1.5	Council (if relevant)	n/a		
AP1.6	Reasons for approval being withheld (and by whom)			

AP2	APPROVAL OF THE ACADEMIC CASE			
AP2.1	Head of School	Name	Signature	Date
	Approved:	<p><b>From:</b> David Evans (MTH)  <b>Sent:</b> Wednesday, February 18, 2015 10:28 AM  <b>To:</b> Jean Whiting (LTS)  <b>Cc:</b> David Evans (MTH)  <b>Subject:</b> Re: Full Course Proposal - BEng and MEng Energy Engineering etc</p> <p>Dear Jean, This has my approval (for both sections).</p> <p>Best wishes</p> <p>David</p>		
	Approved with amendments:	n/a	n/a	n/a
	Rejected:	n/a	n/a	n/a
	Comments (if any):	n/a		
AP2.2	Faculty Associate Dean (for Faculty LTQC)	Name	Signature	Date
	Approved:	Ben Milner	<p><b>From:</b> Ben Milner (CMP)  <b>Sent:</b> Wednesday, April 15, 2015 4:31 PM  <b>To:</b> Carole Bull (LTS)  <b>Subject:</b> Re: MTH with a FY</p> <p>Carole,</p> <p>Yes, I approve the proposal.</p> <p>Ben.</p>	15/04/15
	Approved with amendments:			
	Rejected:	n/a	n/a	n/a
	Comments (if any):	n/a		

AP2.3	PVC Academic (for LTC)	Name	Signature	Date
	<b>Approved:</b>			
	<b>Approved with amendments:</b>			
	<b>Rejected:</b>			
	Comments (if any):			
<b>Where applicable:</b>				
AP2.4	Secretary to Council	Name	Signature	Date
	<b>Approved:</b>			
	<b>Approved with amendments:</b>			
	<b>Rejected:</b>			
	Comments (if any):			

**FULL COURSE PROPOSAL**

<b>Note N1</b>				<b>NOTIFICATION OF APPROVAL</b>	
This section should be completed by Faculty FLTQC Secretary once a course proposal has been approved. Its purpose is to ensure that relevant Offices are informed of the approval of course proposals (new courses and course amendments), in accordance with the procedures for course approval.					
<b>FACULTY</b>		SCI		<b>SCHOOL</b>	
<b>NEW COURSE?</b>		Y	N	If NO, please enter existing course code	
<b>DEGREE AWARD (e.g. BSc/MA)</b>			BSc		
<b>TITLE OF PROGRAMME</b>			Mathematics with a Foundation Year		
<b>START DATE</b>	Sept 2015		<b>LENGTH OF COURSE</b>		4
Course Approved by:		Name of Committee Chair		Date of approval	
<b>Faculty Learning and Teaching Quality Committee (FLTQC)</b>		Ben Milner			
<b>Learning and Teaching Committee (LTC)</b>		Neil Ward			
RELEVANT OFFICE INFORMED? *insert date					
<b>Planning Office</b>	<b>Admissions and Marketing</b>		<b>Learning and Teaching Service</b>		<b>Union of UEA Students</b>
*	*		*		*
sis.records@uea.ac.uk	arm.operations@uea.ac.uk		Email the LTS coordinator responsible for the course		union.academic@uea.ac.uk

<b>Note N1</b>		<b>IMPLEMENTATION ACTIONS</b>	
<b>COURSE NAME</b>		<b>NEW ROUTE CODE</b>	
Mathematics with a Foundation Year			
<b>ACTION</b>			<b>DATE</b>
<b>COURSE INFORMATION LIVE IN ADMISSIONS</b>			
<b>PROGRAMME SPECIFICATION UPLOADED ONTO WEBSITE</b>			
<b>COURSE PROFILE UPLOADED ONTO SITS</b>			
<b>COURSE CLOSURES COMMENCED (where appropriate)</b>			

**Appendix 1****Compulsory Existing Module Outlines****Year 1:**

<b>MTH**TBC**, ADVANCED MATHEMATICS</b>	
<b>Academic Session</b>	2015/16
<b>Period</b>	YEAR
<b>Occ.</b>	A
<b>Slot</b>	AA
<b>Credit Value</b>	20
<b>School</b>	Mathematics
<b>Actual (Target)</b>	(11)
<b>Module Organiser</b>	Dr Mark Cooker
<b>Assessment</b>	Examination with Coursework or Project

**Module Description**

The module extends material beyond Basic Mathematics I and Basic Mathematics II, and takes some topics from the equivalent of the Further Maths A-level syllabus. Simple common sets, notions of mathematical rigour and proof by induction, ideas of function such as  $f(x)=(ax+b)/(cx+d)$  for curve sketching, including identifying asymptotes. Trig-functions and trig identities, including graph sketching aided by the derivative as the slope of a curve. The hyperbolic functions. Maclaurin series expansions. Matrices and determinants (2x2 and 3x3) and their link with vector-cross-product, and examples of matrix-transformations of the plane and of space. Once integration is being covered in Basic Maths II, some first-order differential equations for modelling. E.g. a car decelerating within a braking distance; a body falling with air-resistance. Second-order equations may be treated, time-permitting, e.g. either damped simple harmonic motion, or the beam equation.

**MTHB0001A, BASIC MATHEMATICS I**

<b>Academic Session</b>	2014/5
<b>Period</b>	SEM1
<b>Occ.</b>	A

<b>Slot</b>	"B2, C8, D8, C6/C7/D4"
<b>Credit Value</b>	20
<b>School</b>	Mathematics
<b>Actual (Target)</b>	113 (131)
<b>Module Organiser</b>	Mr Glyn Warnes
<b>Assessment</b>	Coursework

**Module Description**

Taught by lectures and seminars to bring students from Maths GCSE towards A-level standard. The module covers functions, polynomials, quadratics, trigonometry and differential calculus.

**MTHB0002B, BASIC MATHEMATICS II**

<b>Academic Session</b>	2014/5
<b>Period</b>	SEM2
<b>Occ.</b>	B
<b>Slot</b>	"B2, C8, D8 E4/D4/D6"
<b>Credit Value</b>	20
<b>School</b>	Mathematics
<b>Actual (Target)</b>	80 (90)
<b>Module Organiser</b>	Mr Glyn Warnes
<b>Assessment</b>	Examination with Coursework or Project

**Module Description**

Brings students up to the standard needed to take first year Mathematics degree courses. The module covers trigonometric functions, integral calculus, complex numbers, vectors.

**Year 2:****MTHA4001Y, SETS, NUMBERS AND PROBABILITY**

<b>Academic Session</b>	2014/5
<b>Period</b>	YEAR
<b>Occ.</b>	A
<b>Slot</b>	AA (Autumn), CC (Spring)
<b>Credit Value</b>	20
<b>School</b>	Mathematics
<b>Actual (Target)</b>	58 (120)
<b>Module Organiser</b>	Dr Robert Gray
<b>Assessment</b>	Examination with Coursework or Project

**Module Description**

Basic set-theoretic notation, functions. Proof by induction, arithmetic, rationals and irrationals, the Euclidean algorithm. Styles of proof. Elementary set theory. Modular arithmetic, equivalence relations. Countability. Probability as a measurement of uncertainty, statistical experiments and Bayes' theorem. Discrete and continuous distributions. Expectation. Applications of probability: Markov chains, reliability theory.

**MTHA4002Y, LINEAR ALGEBRA**

<b>Academic Session</b>	2014/5
<b>Period</b>	YEAR
<b>Occ.</b>	A
<b>Slot</b>	AA
<b>Credit Value</b>	20
<b>School</b>	Mathematics
<b>Actual (Target)</b>	59 (120)

<b>Module Organiser</b>	Professor David Evans
<b>Assessment</b>	Examination with Coursework or Project

**Module Description**

Linear equations and matrices (including geometric aspects); Determinants. Eigenvalues and eigenvectors, Diagonalization. Vector spaces and linear transformations.

**MTHA4003Y, REAL ANALYSIS**

<b>Academic Session</b>	2014/5
<b>Period</b>	YEAR
<b>Occ.</b>	A
<b>Slot</b>	BB
<b>Credit Value</b>	20
<b>School</b>	Mathematics
<b>Actual (Target)</b>	58 (120)
<b>Module Organiser</b>	Dr Jonathan Kirby
<b>Assessment</b>	Examination with Coursework or Project

**Module Description**

Sequences and series, tests for convergence. Limits, continuity, differentiation, Riemann integration, Fundamental Theorem.

**MTHA4004Y, MATHEMATICAL PROBLEM SOLVING, MECHANICS AND MODELLING**

<b>Academic Session</b>	2014/5
<b>Period</b>	YEAR
<b>Occ.</b>	A
<b>Slot</b>	CC

<b>Credit Value</b>	20
<b>School</b>	Mathematics
<b>Actual (Target)</b>	52 (120)
<b>Module Organiser</b>	Dr Robert Whittaker
<b>Assessment</b>	Examination with Coursework or Project

#### Module Description

STUDENTS FROM YEARS 2 OUTSIDE SCHOOL OF MATHEMATICS CAN TAKE THIS MODULE IF THEY HAVE TAKEN BEFORE MTHA4005Y OR MTHB4006Y OR ENV-4002Y AND THEY HAVE NOT TAKEN MTHB4007B. The first part of the module is about how to approach mathematical problems (both pure and applied) and write mathematics. It aims to promote accurate writing, reading and thinking about mathematics, and to improve students' confidence and abilities to tackle unfamiliar problems. The second part of the module is about Mechanics. It includes discussion of Newton's laws of motion, particle dynamics, orbits, and conservation laws. This module is reserved for students registered in the School of Mathematics or registered on a Natural Sciences degree programme.

#### MTHA4005Y, CALCULUS AND MULTIVARIABLE CALCULUS

<b>Academic Session</b>	2014/5
<b>Period</b>	YEAR
<b>Occ.</b>	A
<b>Slot</b>	DD
<b>Credit Value</b>	40
<b>School</b>	Mathematics
<b>Actual (Target)</b>	66 (100)
<b>Module Organiser</b>	Dr Hayder Salman
<b>Assessment</b>	Examination with Coursework or Project

#### Module Description

This module is incompatible with MTHB4006Y and ENV-4002Y. (a) Complex numbers. (b) Differentiation and integration. Taylor and MacLaurin series. Applications: curve sketching, areas, arc length. (c) First order, second order constant coefficient ordinary differential equations. Reduction of order. Numerical solutions using MAPLE. Partial derivatives, chain rule. (d) Vectors. (e) Line integrals. Multiple integrals, including change of co-ordinates by Jacobians. Green's theorem in the plane. (f) Euler type and general linear ODEs. Phase plane, direction

fields, limit cycles, period doubling and chaos. (g) Divergence, gradient and curl of a vector field. Scalar potential and path independence of line integral. Divergence and Stokes' theorems.

**Year 3:****MTHA5001Y, ANALYSIS**

<b>Academic Session</b>	2014/5
<b>Period</b>	YEAR
<b>Occ.</b>	A
<b>Slot</b>	AA
<b>Credit Value</b>	20
<b>School</b>	Mathematics
<b>Actual (Target)</b>	110 (126)
<b>Module Organiser</b>	Dr David Aspero
<b>Assessment</b>	Examination with Coursework or Project

**Module Description**

(a) Continuity, differentiation, uniform convergence, power series and how they represent functions for both real and complex variables. (b) Topology of the complex plane, holomorphic functions, Cauchy-Riemann equations, complex integration, Cauchy and Laurent theorems, residue calculus

**MTHA5002Y, FLUID DYNAMICS - THEORY AND COMPUTATION**

<b>Academic Session</b>	2014/5
<b>Period</b>	YEAR
<b>Occ.</b>	A
<b>Slot</b>	BB
<b>Credit Value</b>	20
<b>School</b>	Mathematics

<b>Actual (Target)</b>	112 (126)
<b>Module Organiser</b>	Dr Hayder Salman
<b>Assessment</b>	Examination with Coursework or Project

#### Module Description

(a) Hydrostatics, compressibility. Kinematics: velocity, particle path, streamlines. Continuity, incompressibility, streamtubes. Dynamics: Material derivative, Euler's equations, vorticity and irrotational flows. Velocity potential and streamfunction. Bernoulli's equation for unsteady flow. Circulation: Kelvin's Theorem, Helmholtz's theorems. Basic water waves. (b) Computational methods for fluid dynamics; Euler's method and Runge-Kutta methods and their use for computing particle paths and streamlines in a variety of two-dimensional and three-dimensional flows; numerical computation and flow visualisation using Matlab; convergence, consistency and stability of numerical integration methods for ODEs. (c) Theory of Irrotational and Incompressible Flows: velocity potential, Laplace's Equation, sources and vortices, complex potential. Force on a body and the Blasius theorem. Method of images and conformal mappings.



#### MTHA5003Y, ALGEBRA

<b>Academic Session</b>	2014/5
<b>Period</b>	YEAR
<b>Occ.</b>	A
<b>Slot</b>	BB
<b>Credit Value</b>	20
<b>School</b>	Mathematics
<b>Actual (Target)</b>	109 (126)
<b>Module Organiser</b>	Dr Johannes Siemons
<b>Assessment</b>	Examination with Coursework or Project

#### Module Description

(a) Group theory: basic concepts and examples. Cosets, Lagrange's theorem. Normal subgroups and quotient groups. First isomorphism theorem. Quotient spaces in linear algebra. (b) Rings, elementary properties and examples of commutative rings. Ideals, quotient rings. Polynomial rings and construction of finite fields. Unique Factorization in rings. Applications in linear algebra.

**MTHA5004Y, DIFFERENTIAL EQUATIONS AND APPLIED METHODS**

<b>Academic Session</b>	2014/5
<b>Period</b>	YEAR
<b>Occ.</b>	A
<b>Slot</b>	AA
<b>Credit Value</b>	20
<b>School</b>	Mathematics
<b>Actual (Target)</b>	113 (126)
<b>Module Organiser</b>	Dr Richard Purvis
<b>Assessment</b>	Examination with Coursework or Project

**Module Description**

(a) Ordinary Differential Equations: solution by reduction of order; variation of parameters for inhomogeneous problems; series solution and the method of Frobenius. Legendre's and Bessel's equations: Legendre polynomials, Bessel functions and their recurrence relations; Fourier series; Partial differential equations (PDEs): heat equation, wave equation, Laplace's equation; solution by separation of variables. (b) Method of characteristics for hyperbolic equations; the characteristic equations; Fourier transform and its use in solving linear PDEs; (c) Dynamical Systems: equilibrium points and their stability; the phase plane; theory and applications.

**\*\*end of document\*\***