

MATHEMATICS SYLLABUS



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INTERIM JOINT MATRICULATION BOARD EXAMINATION (IJMBE) ADVANCED LEVEL MATHEMATICS SYLLABUS (REVISED 2012)

Introduction:

This one-year course is designed to serve as an intermediate course of study to train students from various colleges to gain insight into basic tools of Mathematics for taking up advanced studies in areas of Pure and Applied Mathematics in Nigerian Universities.

Objective:

The general objective of the course is to train students to gain insight into basic tools of Mathematics for taking up advanced studies in areas of Pure and Applied Mathematics in Nigerian Universities.

Recommendations:

- 1. Candidates should at least study this syllabus for one (1) years before presenting themselves for A-Level Mathematics examination.
- 2. Candidates should have credit in O-Level Mathematics before enrolling into the programme. An exposure to further mathematics is an additional advantage.
- 3. Students must attend lectures and workout some representative exercises from the recommended textbooks.

Examination Structure:

There will be three papers of two hours each.

PAPER I

This will cover Algebra, Trigonometry and Complex Numbers Co-ordinate Geometry - Topics 1 to 15 of the syllabus.

Section A: This will consist of between 5 to 7 short questions drawn from the above three topics and will be worth 20% of the total marks.

Section B: This will consist of three questions on Algebra, each worth 15% of the total marks.

Section C: This with the total marks.

Numbers, each worth 15% of the total marks.

PAPER II

This will cover Calculus, Differential Equations, and Vectors – Topics 16to 20.

- Section A: This will consist of between 5 to 7 short questions drawn from the above three topics and will be worth 20% of the total marks.
- Section B: This will consist of three questions on Calculus, each worth 15% of the total marks.
- Section C: This will consist of three questions on Differential Equations and Vectors, each worth 12% of the total marks.

PAPER III

This will cover Co-ordinate Geometry and Statistics - Topics 21 to 28.

- **Section A:** This will consist of between 5 to 7 short questions drawn from the above two topics and will be worth 20% of the total marks.
- **Section B:** This will consist of three questions on Co-ordinate Geometry, each worth 15% of the total marks.
- Section C: This will consist of three questions on Statistics, each worth 15% of the total marks.
- NOTE: In each paper, candidates must attempt ALL the questions in Section A.

 They must also attempt FOUR questions from Sections B, and C including at least ONE question from each of these sections.

Continuous Assessment:

Continuous assessment will be considered for all candidates and will constitute 20% of the final score. The written examination will constitute 80% of the final score. Out of all the tests and assignments undertaken by each candidate, at least FOUR (4) may be selected and used for continuous assessment.

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FIRST SEMESTER

270:	TOPICS AND CONTENTS	ACTIVITIES / PRACTICAL GUIDE	
S/NO:	SET, RELATIONS	Generate elementary examples of	DURATION
1.	FUNCTIONS AND	functions. Also form simple example	
	OPERATIONS	to elucidate inclusion-exclusion	
	The definition of a set, finite and		2weeks/12hrs
	infinite sets, equality of sets,	principle. De Morgan's laws need to	
		be proved analytically. Proofs by	31.5 1
	,	Venn diagram are acceptable	
	universal set, complements,	al late gridger to consequence	
	empty set, Venn diagram	The second of th	
part hade	symmetric difference, power	are good from those A year period and	
	sets and De Morgan's laws.	emetrics of the view to	
	Inclusion-exclusion principle.	topp more a common to an	
	Elements of relations functions		
	and operations		
2.	SOME PROPERTIES OF	Generate examples of rational and	
	NUMBER SYSTEM	irrational numbers. Manipulate the	
	Natural numbers, integers,	algebraic properties of real numbers	1223
	rationals, irrationals and real	by concrete examples. No analytic	
entity -	numbers. Order relations on the	proof of properties is needed	nqz = [
	set of real numbers. Open and		Iweek/6hrs
	closed intervals on the number	A SAME COMME	
	line		
3.	INEQUALITIES	Generate specific examples of	1 1000
	Definition of absolute value for	inequalities such as	1356
ANT T	modulus of a real number.	ax + b > 0,	bibli
	Solving inequalities involving	$ax^{2} + bx + c > 0, x - a >$	
	linear and quadratic functions.	x-b	1week/6hrs
	Solution sets of inequalities	1, etc. and solve them.	
4.	PRINCIPLE OF	Generate concrete examples of	
	MATHEMATICAL	Arithmetic and Geometric	
	INDUCTION AND ITS	progressions. Also evaluate	
	APPLICATIONS	Arithmetic and Geometric means and	1week/6hrs
	Intuitive definition of a	know their relationships. Only finite	
	sequence and a series.	cases need to be treated except in	
	Arithmetic and Geometric	Geometric progression where	
	progressions and means. The	common ratio is less than one	went 1
	sigma notation. Evaluation of	er, and its ase who cut is a	
11 1	Σn , Σn^2 by using mathematical	er, and its disc which is a leaf to the first transfers of	
1	induction	ACCOMMENTAL XOUNTED	.ner
5.	QUADRATIC AND OTHER	Master the determination of roots by	
1	POLYNOMIAL FUNCTIONS	taking some concrete examples of	NIS 1
	Elementary properties of	quadratic equations. Learn to also	Guly I was a training
	quadratic expressions. Sums	determine the range of variable in a	
	and products of roofs of	quadratic expression under given	
140 (30)	and bionicis of tools of t	quadratic expression under given i	
7-	and products of roofs of quadratic equations. Applications to symmetric	conditions	

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	functions. Polynomial functions	(1000	
	of 3 rd and 4 th degrees that can be		
	reduced to quadratic ones.	*	
	Remainder and factor theorems		
	the factor discording		
	The state of the s		7 1 1 E T
1 .	The state of the s		
	N. W. Const.		,
6.	INDICES AND	To demonstrate the application of	
	LOGARITHMIC	various bases of logarithms, e.g.	
1 1	FUNCTIONS	$\log_a b = \log_c b$	Se 2 1 1 1 1 1 1 1 1 1
1 1	Index notation, multiplying and		
1	dividing expressions involving	log _c a	- 13 · 1
1	indices Negative and f	Proofs of various laws of logarithms	0/985
1 1	indices. Negative and fractional	be given	I week/6hrs
1 1	indices. Laws of logarithms.		The controlling
	Solutions of simple exponential	And the property of the second	
	and logarithmic equations		
7	PARTIAL FRACTIONS	Master the tool	
	Types of partial fractions.	Master the techniques to resolve	
	Applications of partial fractions	functions such as	1.07
	in supporting partial fractions	Α . Α	
1 1	in summation of series and	$(x-\alpha)(x+\beta)$, x^2+bx+c ,	
1	expansion of rational functions	A	
		$(x + \alpha)(x^2 + bx + c)$, etc.	11.161
8.	DETERMINANTS AND	Need to	lweek/6hrs
1 1	MATRICES	Need to work out several concrete	
		examples of determinants and	
	Definition and properties of	matrices. Not to go beyond Cramer's	
1 1	second and third order	rule	
1	determinants. Applications of		
1	determinants to solve	1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	20000100/121
-190	simultaneous linear equations		2weeks/12hrs
1	using Cramer's rule. Algebraic		
	operations, addition, subtraction	4	
1 1	and multiplication of		
1	and multiplication of matrices.		
	Multiplication of a matrix by a	7 100	
programmes	scalar. Restricted to 3 x 3	18 7 2 3 7 7 2	
	matrices	The state of the s	
9.	BINOMIAL THEOREM	Generate examples to demonstrate the	
	Binomial expressions. Pascal's		
	triangular array. The expansion	t i i	
	of $(a + x)^n$, where n is a positive	calculating errors. Confine to	me i
	integer and its use of	expression involving two terms only	100
	integer, and its use where n is a	" in the both of	1
	rational index. Determination of	in a man controller with it had all the	2weeks/12hrs
1	the interval of x for which a	the state of the s	2
12	given Binomial expansion is	THE PROPERTY SHEET	1. 1
7	valid. Approximation and errors	en en typing generalisa (in the second	
10.	PERMUTATIONS AND	Generate come	
""	COMBINATIONS	Generate concrete examples to	
		illustrate how to apply the formulae of	
	Factorial notation, "P _r , "C _r and	"P _r and "C _r . Only simple cases need to	1week/6hrs
	simple examples	be treated	
11.	CIRCULAR MEASURES	Generate examples of trigonometric	
	Functions and their graphs. Odd,	functions and determine the periods,	
		the periods,	

	even and periodic functions. Trigonometric ratios of any magnitude I	amplitude phase at-	
	Trigonometric rations of Trigonometric rations	WW.READNIGERIANETWORK:COM	
	of any magnitude. Inverse	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	
	trigonometric functions. Graphs	At the world of the state	2weeks/12hr
	of trigonometric functions		2
12.	COMPOUND ANGLE	1	1 - 1 - 1
12.	FORMULAE	1 Laster the methods of broot involving	2
		nair and multiple angles in particular	
	TRIGONOMETRIC	workout various examples of	
	EQUATIONS	trigonometric equations	1111
	The formulae $\sin (A + B)$, \cos	FORDAM TEXT SHE SHEET AND	200001-1101
	(A + B), tan $(A + B)$ and their	THE PROPERTY OF THE PROPERTY O	2weeks/12hi
	proofs. Multiple and half angles.	The state of the s	
	Simple identities. The solution	and classes the consumer that	
	of simple trigonometric	PROTOTO	
	equations, e.g. $a\cos\theta + b\sin\theta =$	ornige v	
	$R\cos(\theta \forall \alpha)$. Factor formulae	ins maken	
13.	SINE AND COSINE RULES		ties of the same
13.		Master various methods of solutions	1
	Application of sine and cosine	of triangles excluding ambiguous case	
	rules to the solution of triangles.	. 573	1week/6hrs
1.4	Heights and distance) (All Galley 2 Mar 19 Mag 1 1)	Tweeld only
14.	PLANE AND POLAR	Master the sketch of simple polar	26.
	CO-ORDINATES	graphs, e.g. $r = a + b\cos\theta$. Only linear	Marine V
٠		cases are to be treated	10.00
	Relations between Polar and	The second of th	- SEC. 1
	Cartesian coordinates. Plotting		200001/101
	and sketching of simple curves	A VENTON	2weeks/12hrs
	whose polar equations are	es meeral and its in-	1 1 10111
	known	An Matt Rett. on the Thousand w	262.27
15.	COMPLEX NUMBERS	Generate various examples of	
4	Definition of a complex number,	22-1-1	
	addition, subtraction,	i i i i i i i i i i i i i i i i i i i	growth sq.
	multiplication and division of	magnitudes and arguments. To	
	complex numbers. Modulus,	determine nth roots of a given complex quality, e.g. $(1 + i)^{1/3}$, $i^{1/5}$. No	2weeks/12hrs
	conjugation argument.	proof of Do Main 1 1 No	
	Geometric interpretation. Polar	proof of De Moivre's theorem for	the state of
	representation. De Moivre's	fractional index is needed	
	theorem. Nth roots of Unity		
16.	LIMITS AND CONTINUITY	0	
erea .	OF FUNCTIONS	Generate examples to find limits and	
	Definition c	test continuity at a given point. No	
	Continuity C. c.	analytic proofs are needed	
11	simple examples. Proof of	· Contract	
		Pilleria i a	
1	AA0	0.7915934 2003 2004 2004	
4	1		
	Asymptotes (parallel to the axes	Tener to see all its interesting pe	2weeks/12hrs
	graph sketching, Graphs	Military of the Managing p	CDRG/ 121115
		Control of the Contro	
	algebraic functions l	A Company of the Comp	
	(polynomials and simple	Della Color of the Street and the	
	(polynomial functions	Den Court of the Street and the	

	Exponential and logarithmic		a comment of the
	functions to Various Bases	.READNIGERIANETWORK.COM	
m ja	Knowledge of the series		
- 1	expansion of e ^x for all x and In	Land of the Court	
	(1 + x), for $-1 < x < 1$.	p av gave or there's restaurant	
			Total 150hr

	SECOND SEMESTER	Page and a said	
1.	DIFFERENTIATION	Generate examples of Implicit,	4:15 7
21 11 11 11	Differentiation from the first	st inverse trigonometric, logarithmic and	100
	principle. Meaning of derivativ		3.11
1	and interpretation as a rate of		
	change. Differentiation of		2 (30)
ÎI.	elementary functions		(4)
1	Differentiation of sums	TO STATE WILLIAM CONTROL OF	3weeks/18hrs
	differences, products and	1 22 PM PM 201 + 4 PM 20 10 20 20 1	
	quotients The chain rule		
1	Implicit differentiation. Higher		2011
1	derivatives. Differentiation of		territo i
111115	7	Transport of the last part of	** 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
The little of an ellipse and	inverse trigonometric functions		1 1- 1
1	logarithmic and exponential		K = 1 Ta7
1	functions. Application to curve		-61 P
	sketching. Maxima and minima.		
	Newton's approximation and		aran i
our II.	errors		
2.	INTEGRATION	Master various methods of	
	Definite integral and its		rate in
	representation as an area.		1 1 1 1 1 1
	Integration as the inverse of		
	differentiation. Integration of	integrals need to be treated	
	elementary functions.	Australian I multiple La	2weeks/12hrs
ula l'est.	Techniques of integration (by	Samuel Color for the same of t	
	partial fractions, by substitution	extension and a sub-side of the sub-	
1	and by parts). Integration using	The Annual Principle of Designation Control	
	identities and standard formulae.	Lawrence of Landson, the Lawrence of the Landson, the Landson of t	
, ,	Applications of integration to	CARDINE THE SECTION OF THE PROPERTY SECTION	0.41
4	areas and volumes	The transfer	7-21
3.	DIFFERENTIAL EQUATIONS	Generate some simple examples of	
		first order differential equations and	114 100
1	First order differential equations	integrate them. Only intuitive	1week/6hrs
. 1.	only	understanding of the concept need to	ord
	The transfer of the second	be given	0.34
4.	VECTORS	Master the representation and	100
111	Notion of a vector, position	determination of magnitude and	
	vector, modulus of a vector.	direction cosine of vectors. Need to	50 H
	Scalar product of vectors.		AF
	Representation as a directed line	concentrate on concrete and simple	
	_	examples	
	segment. Equal, unit, zero and	The second secon	
	parallel vectors. Position vector	1 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	
	of a point dividing a line in a		

	given ratio. Commutative,	1 (a) 1 (1 rance position	2weeks/12hrs
	given ratio. Commutative, distributive, associative and	1	
	parallelogram laws.	I .	as are in E
	Components of a vector.		A ship for a contract
	Resolution of vectors into	the state of the s	
1			. 97
	orthogonal components.		and the second second
	Resultant of coplanar. Vector		The state of the s
E21, 1 a	products of vectors.		
	Perpendicular vectors. Scalar	and the second second second second	
	product of parallel vectors.	and the state of t	
	Subtraction of a vector as the		
	addition of its additive inverse.		
	Angle between two? Vector		of a second
1	equation of a line. Direction	Object Services and Control of the C	
	vector. Direction ratios and	are addite a pigging and read	- 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	cosines. Distance of a point	Franciscope January	7
and Strike	from a line. Linear dependence	was a second of the second of	
	and independence of vectors	Construct concrete examples of	100
5.	CO-ORDINATE GEOMETRY	Construct concrete examples of equations of lines. Find out the	22.39 8
	OF LINES AND CIRCLES	equations of tangents and normals.	
	Gradient of a line. Distance	Only standard forms need to be	man 12 d
	between two points. Equation		3weeks/18hrs
	of a linear graph from the	considered	79.5
	gradient and the y-intercept.	v lategra	en anni P
29/1/1/2	Division of a line in a given	Figure 1. Company and Company of the	
	ratio. Equation of a line from	The second secon	
	two points on the line.		
	Midpoints equation of a line	91 J. J. 1989)	
[i	(including the gradient and	AND THE PARTY OF T	
pt 11 (u.)	intercept forms). Point of	alegandos form decida inchi i come	
	intersection of two lines.	The same of the sa	
	Equation of a line through the	de prod : Ata nin	
	point of intersection of two	od Ligaria mile and in a contract	
	given lines. Equation of a line	skrifterred sometor and a first	
l	from a given point and the	being markets of an electric at the	
21001 04	gradient. Angle between two	markage or to recited k	
	lines. Parallel and perpendicular	product to the order to be set.	53/37
	lines. Distance of a point from a	the garantee with the	1000
	line. Equation of a circle with a	pro the property best	
	given Centre and radius; with a	- Lower English and Mouth	
	given diameter. Equation of	solven blank	
	tangent to a circle.	fi-a should	
6. '	CONIC SECTIONS	Only standard forms of conics should	1003
1912	Properties of Parabola, Ellipse,	be considered	ous I I
	Hyperbola, Rectangular	the state of the state of the state of the	
	hyperbola, their Cartesian and	कार्य हैना स्वाहर	
	Parametric equations. Problems	AL . 45.0	Queals/12hm
of her t	involving elimination of	The state of the s	2weeks/12hrs
9	Parameters. Equations of		
	tangents and normals. General		
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	11	equation of second degree and	Sellate of the extra	5 M - 1
		conditions under Conditions under Conditions	W.READNIGERIANETWORK.COM	
		represents a pair of lines, circles	A contract of the contract of	A2.1 9.1
-		and other conics	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	* 101
	7.	STATISTICAL MEASURES	Construct concrete examples of the	1 2 5 1 1
		AND GRAPHS	two measures. Also draw interences	· Williams
		Measures of control tendency	from graphs and interpret. Simple	12-08
		and variation: Mean, Median,	cases only	2weeks/12hrs
1		Mode, ranges, variation and	Land to the will stand the training	
		standard deviation. Histograms		
		and cumulative frequency	the second secon	
L		polygons	The same of the sa	
	8.	PROBABILITY	Perform illustrations with coin and	
		Axiomatic definition of	dice throwing experiments. Some	* 70 (15)
		probability. Discrete sample	simple examples of probability trees	rendered in 20 Miles
		space. Events. Frequency	should be also constructed	4.60
		interpretation. Sum and product	0.000 140 110 140 140 140 140	2weeks/12hrs
		laws. Conditional probability.		
		Dependent and independent	19. 16. 16. 2 1 1. 18. 18. 18. 18. 18. 18. 18. 18. 18	
-		events. Tree diagrams	1200 3 200 to 1 23 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 21)
	9.	RANDOM VARIABLES	Use concrete examples of both	(4,6)
		Types of random variables.	discrete and continuous random	- Tot Total
		Probability density function.	variable. Also calculate and interprete	s, 1a)
		Cumulative distribution	expected values and standard	above 1 - Co.
		function. Expectation, standard	deviation of discrete random variable.	1week/6hrs
\vdash	10	deviation and variance	A second of management of	0.00
	10.	PROBABILITY	Concrete examples of these	is a state of the
		DISTRIBUTIONS	distributions should be constructed.	The state of the state of
		Binomial, poison and normal	Derivations of these distributions are	
		distributions; their means and	not required	2weeks/12hrs
\vdash	11	variances	See the first to come,	The second
	11.	REGRESSION	Some simple concrete examples	A CONTRACTOR
		Scatter diagrams. Regression	should be constructed. No exponential	Aurel MAR
		line and its characteristics.	or multiple regression is required	
		Linear regression equation and	1 1 8 % m 29 m 2	
		curves. Fitting of regression	the first wind only he said	2weeks 12hrs
	- 1	lines by the method of least	in the second section of	. 13 LJP7.1
		squares. The meaning of	· · · · · · · · · · · · · · · · · · ·	
		regression coefficient and its	le to the majorine real	
	_\	estimation from graphs. The use	". The transform a transfer of a	
-	10	of regression lines		Asia 13 Th
7	12.	CORRELATION	Simple examples of these coefficients	
	7	COEFFICIENT	should be constructed	
1		Product moment correlation	The second of the second of the second	2weeks/12hrs
		coefficient and Spearman's rank	1061 - 1001 - 001 - 001	ZWCCKS/12III5
_	10	correlation coefficients	the street of the state of the	
	13.	Revision	All and the Administration of the Administra	1
			The state of the s	1week/6hrs

Total 144hrs

Recommended Texts / Reference Materials: Digerian Etwork.com

- 1. K.A Stroud: Engineering mathematics 6th Edition. Palgrave Macmillan Houndmills; 2007.
- 2. Backhouse J. K., : Pure Mathematics. Volume's 1 & 2.. Longman. Group Limited 1990 Bostoch L. and Chandler S.: Core Mathematics For A-Level. Volume's 1& 2 Stainley Thornes Ltd., Cheltenham, England; 1990.
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- 4. Tuttuh. M.R., Sivasubramaniam S., and Adegoke R. Further Mathematics projects 1, 2 and 3.NPS Education Publishers Limited; 1997.
- 5. Murray R. S.,:Schaum's outline series Probability and Statistics Mcgraw-Hill Book Company; 1980.
- 6. Godman A., Talbert J. F., and Ogum G. E O. Additional Mathematics for west Africa, Longman Group Limited 1994
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