Curriculum overview for MATH ANALYSIS AND APPROACHES, SL, 3mn, School Year 2019/2020 Teachers: Marina Bilić Maja Đerek

Unit title / Month	Concept(s)	Content	Objectives / Learning outcomes	Assessment tasks	ATL skills	Links to other subjects
Unit 1: From patterns to generalisation Ch: 1 September, October 7 weeks	Generalization, representation, modelling, equivalence, patterns, validity, systems	Topics:	Knowledge and understanding Problem solving Communication and interpretation Technology Reasoning Inquiry approach	• Progress test • Unit test • Quizzes	Communication skills (understand, use and interpret math. notation) Social skills (negotiate ideas) Self-management skills (develop new skills, techniques and strategies for effective learning) Thinking skills (draw reasonable conclusions and generalizations and test them) Research skills (examine, select and reject sources)	Links to other subjects: Loans and repayments (economics) International- mindedness: The properties of "Pascal's triangle" have been known long before Pascal. Aim 8: Ethics behind borrowing/lending money. TOK: Is mathematical reasoning different from scientific reasoning/reasoning in other Areas of Knowledge?
Unit 2: Representing relationships: functions Ch: 2,3	Representation, relationships, quantity, equivalence, systems, patterns	Topics: Topics: The equation of a straight line Domain, range and graph of a function Composite functions Inverse function	 Knowledge and understanding Problem solving Communication and interpretation Technology 	Progress testUnit testQuizzesSemester exam	 Communication skills (use graphs to understand relationships) Social-collaboration (work collaboratively in teams) 	Links to other subjects: demand and supply curves (economics); graphical analysis (sciences); kinematics, projectile motion, radioactive

November,		•Identity function	 Reasoning 		•Self-management-	decay, (physics);
December,		•The quadratic function	Inquiry approach		organisation skills (bring	reactions and
		•The reciprocal function			necessary equipment	activation energy
9 weeks		 Rational functions 			and supplies: GDC)	(chemistry); growth
		 Odd and even functions 			Thinking-critical	curves (biology).
		Exponential and			thinking skills (use	International-
		logarithmic functions			models and simulations	mindedness: The
		and their graphs			to explore complex	development of
		Transformations of			systems and issue)	functions by Descartes
		graphs.			 Research skills (citation 	(France), Leibnitz
		Skills:			and referencing skills)	(Germany), Euler
		to graph a function;			-	(Switzerland)
		 to find the point of 				Aim 8: Is misleading
		intersection using				use of "exponential
		technology.				growth" when used
		 to solve equations and 				popularly?
		inequalities both				TOK: What role do
		graphically and				"models" play in
		analytically				mathematics?
Unit 3:	Change,	Topics:	Knowledge and	Progress test	◆Communication skills	Links to other
Measuring	patterns,	 Derivative interpreted as 	understanding	•Unit test	(adopt strategies	subjects: Marginal
change:	relationships,	gradient function and as	Problem solving	•Quizzes	appropriate for	cost, revenue, profit,
differentiatio	approximation,	rate of change	Communication	Quizzes	different situations)	(economics);
n	generalization,	•Tangents and normal	and interpretation		Social-collaboration	Instantaneous velocity
Ch: 4	modelling,	• Rules of differentation:	Technology		(work collaboratively)	kinematics (physics);
January,	systems,	sum, product, quotient,	Reasoning		Organization skills	interpreting the
February,	quantity	chain	Inquiry approach		(managing time and	gradient of a curve
March	. ,	•Increasing and			tasks effectively)	(chemistry)
		decreasing functions			Thinking skills (apply	International-
5 weeks		• Local maximum and			skills in unfamiliar	mindedness:
		minimum points			situations)	Indian mathematicians
7.1 24.4		•The second derivative				attempted to explain
		Skills:				division by zero.

Unit 4: Relationships in space: geometry and trigonometry Ch: 6 April, May, June 8 weeks	Generalization, space, relationships, equivalence, representation, quantity	 To find equations of tangents and normals To test for maximum/minimum. To find stationary points Topics: The distance and midpoint in 3D Volume and surface area The angle between lines The sine and cosine rule The circle: radians, length of an arc, area of a sector. The unit circle and trigonometric functions Trigonometric equations Double angle identities The relationship between trig. ratios Skills: To solve the ambiguous case for sine rule To apply trigonometry To determine amplitude and period of trig.fun To solve trigonometric equations in a finite interval- graphically and analytically 	Knowledge and understanding Problem solving Communication and interpretation Technology Reasoning Inquiry approach	•Progress test •Unit test •Quizzes •Year exam	Research skills (present and communicate resulting work) Communication skills (formulate arguments in a convincing manner and take full account of other viewpoints) Social-collaboration (work collaboratively in teams during group work) Organization skills (managing time and tasks effectively) Research skills (comparing, contrasting and validating information)	TOK: Is infinitesimal behaviour applicable to real life? Is intuition a valid way of knowing in mathematics? Links to other subjects: Design technology; volumes of stars and inverse square law, (physics) International-mindedness: Why are there 360 degrees in a complete turn? Links to Babylonian mathematics. TOK: Which is a better measure of angle: radian or degree? What criteria can/do/should mathematicians use to make such decisions?
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Curriculum overview for ANALYSIS AND APPROACHES, HL, 3mn, School Year 2019/2020 Teacher: Jelena Gusić

Unit title / Month	Concept(s)	Content	Objectives / Learning outcomes	Assessment tasks	ATL skills	Links to other subjects
Unit 1: From patterns to generalisation Ch: 1 September, October 7 weeks	Generalization, representation, modelling, equivalence, patterns, validity, systems	Topics: Arithmetic sequences and series Geometric sequences and series Compound interest The binomial theorem Counting principles Permutations and combinations Partial fractions Complex numbers in Cartesian form Principle of mathematical induction Skills: to use sigma notation to model real-life situations using sequences to find specific term in binomial expansion to perform operations with complex numbers	Knowledge and understanding Problem solving Communication and interpretation Technology Reasoning Inquiry approach	• Progress test • Unit test • Quizzes	Communication skills (understand, use and interpret math. notation) Social skills (negotiate ideas) Self-management skills (develop new skills, techniques and strategies for effective learning) Thinking skills (draw reasonable conclusions and generalizations and test them) Research skills (examine, select and reject sources)	Links to other subjects: Loans and repayments (economics) International- mindedness: The properties of "Pascal's triangle" have been known in a number of different cultures long before Pascal. Aim 8: Ethics behind borrowing/lending money. TOK: Is mathematical reasoning different from scientific reasoning/reasoning in other Areas of Knowledge? Is it possible to know about things of which we can have no experience (infinity)?
Unit 2:	Representation, relationships,	Topics: • The equation of a straight line	Knowledge and understandingProblem solving	Progress testUnit testQuizzes	•Communication skills (use graphs to	Links to other subjects: demand and supply curves

Representing	quantity,	• Domain, range and	Communication	•Semester	understand	(economics); graphical
relationships:	equivalence,	graph of a function	and interpretation	exam	relationships)	analysis (sciences);
functions	systems,	 Composite functions 	Technology		 Social-collaboration 	kinematics, projectile
Ch: 2,3	patterns	Inverse function	Reasoning		(work collaboratively	motion, radioactive
November,		Identity function	•Inquiry approach		in teams)	decay, (physics);
December,		 The quadratic function 	. ,		Self-management-	reactions and
		 The reciprocal function 			organisation skills	activation energy
9 weeks		 Rational functions 			(bring necessary	(chemistry); growth
		 Absolute value functions 			equipment and	curves (biology).
		 Polynomial functions 			supplies: GDC)	International-
		The factor and			Thinking-critical	mindedness: The
		remainder theorems.			thinking skills (use	development of
		 Sum and product of the 			models and	functions by Descartes
		roots of polynomial			simulations to	(France), Leibnitz
		equations			explore complex	(Germany), Euler
		 Odd and even functions 			systems and issue)	(Switzerland)
		Exponential and			 Research skills 	Aim 8: Is misleading
		logarithmic functions			(citation and	use of "exponential
		and their graphs			referencing skills)	growth" when used
		Transformations of				popularly?
		graphs.				TOK: What role do
		Skills:				"models" play in
		to graph a function;				mathematics?
		•to find the point of				
		intersection using				
		technology.				
		•to solve equations and				
		inequalities both				
		graphically and				
		analytically				
Unit 3:	Change,	Topics:	 Knowledge and 	Progress test	•Communication skills	Links to other
Measuring	patterns,	 Concepts of a limit, 	understanding	Unit test	(adopt strategies	subjects: Marginal
change:	relationships,	continuity and	Problem solving	Quizzes		cost, revenue, profit,

differentiatio	approximation,	differentiability of a	Communication		appropriate for	(economics);
n	generalization,	function at a point	and interpretation		different situations)	Instantaneous velocity
Ch: 4	modelling,	 Derivative interpreted as 	Technology		Social-collaboration	kinematics (physics);
January,	systems,	gradient function and as	•Reasoning		(work	interpreting the
February,	quantity	rate of change	 Inquiry approach 		collaboratively)	gradient of a curve
March		 Tangents and normal 	and any alpha and a		Organization skills	(chemistry)
		Rules of differentiation:			(managing time and	International-
5 weeks		sum, product, quotient,			tasks effectively)	mindedness:
		chain			Thinking skills (apply	Indian mathematicians
7.1 24.4		Increasing and			skills in unfamiliar	attempted to explain
		decreasing functions			situations)	division by zero.
		 Local maximum and 			 Research skills 	TOK: Is infinitesimal
		minimum points			(present and	behaviour applicable
		•The second derivative			communicate	to real life? Is intuition
		Skills:			resulting work)	a valid way of knowing
		 To find derivative from 				in mathematics?
		the first principles				
		 To find equations of 				
		tangents and normals				
		•To test for maximum				
		and minimum.				
		•To optimize				
		•To find stationary points				
Unit 4:	Generalization,	Topics:	 Knowledge and 	Progress test	Communication skills	Links to other
Relationships	space,	•The distance and	understanding	Unit test	(formulate	subjects: Design
in space:	relationships,	midpoint in 3D	Problem solving	Quizzes	arguments in a	technology; volumes
geometry and	equivalence,	Volume and surface area	Communication	Year exam	convincing manner	of stars and inverse
trigonometry	representation,	•The angle between	and interpretation		and take full account	square law,
Ch: 6	quantity	Ines/planes • The sine and cosine rule	Technology		of other viewpoints)	vectors, forces
April,			Reasoning		Social-collaboration	(physics)
May,		•The circle: radians,	Inquiry approach		(work collaboratively	International-
June		length of an arc, area of			in teams during	mindedness: Why are
		a sector.			group work)	there 360 degrees in a

8 weeks	•The unit circle and	 Organization skills 	complete turn? Links
	trigonometric functions	(managing time and	to Babylonian
	 Trigonometric equations 	tasks effectively)	mathematics.
	 Reciprocal trigonometric 	 Research skills 	TOK: Which is a better
	ratios; the inverse	(comparing,	measure of angle:
	trigonometric functions	contrasting and	radian or degree?
	 Compound angle 	validating	What criteria
	identities	information)	can/do/should
	 Relationships between 		mathematicians use to
	trigonometric functions		make such decisions?
	and the symmetry		
	properties of their		
	graphs		
	<u>Skills:</u>		
	 To solve the ambiguous 		
	case for sine rule		
	To apply trigonometry		
	To determine amplitude		
	and period of trig.fun		
	 To solve trigonometric 		
	equations in a finite		
	interval- graphically and		
	analytically		
	◆To apply Pythagorean		
	identities on trig.fun		
	•To determine domain		
	and range of inverse and		
	reciprocal trigonometric		
	functions		