都立国際高校　年間授業計画／Tokyo Metropolitan Kokusai High School　Course Syllabus

○ 科目基礎情報 (Course information)

開講年度	(Academic year)	令和5年度（2023年度）
開講学科	(Department)	国際学科国際バカロレアコース／IBDP(International Baccalaureate Diploma Programme)
教科	(Subject Area)	Mathematics
科目	(Subject)	Mathematics: applications and interpetation, Higher Level
学年・クラス	(Grade・Class)	DP1
単位数	(Number of units)	6
使用教科書	(Text Books)	Peason Mathematics: Applications and Interpretation for the IB Diploma, Higher Level
校外学習	(Field trip)	

○ 教科の目標 (Goals of the subject area)

【知 識 及 び 技 能】　(Knowledge and Skills)
　Understand the concepts, principles and laws in mathematics, the skills to mathematically interpret and express events and the skills to model real-life phenomena using mathematics.
【思考力、判断力、表現力等】　(Ability to think, make judgements, express themselves)
　Develop un understanding of the principles and natures of mathematics, develop logical, critical and creative thinking. Employ and refine powers of abstraction and generalization.
【学びに向かう力、人間性等】　(Motivation to learn, Humanity)
　Develop an attitude to recognize the advantages of mathematics and actively utilize mathematics, an attitude to think tenaciously and make judgments based on mathematical arguments, an attitude to reflect on the process of solving problems.

○ 科目の目標 (Goals of the subject)

【知識及び技能】 (Knowledge and Skills)	【思考力、判断力、表現力等】 (Ability to think, make judgements, express themselves)	【学びに向かう力、人間性等】 (Motivation to learn, Humanity)
Understand the concepts, principles and laws in mathematics, the skills to mathematically interpret and express events and the skills to model real-life phenomena using mathematics.	Develop an understanding of the principles and natures of mathematics, develop logical, critical and creative thinking. Employ and refine powers of abstraction and generalization.	Develop an attitude to recognize the advantages of mathematics and actively utilize mathematics, an attitude to think tenaciously and make judgments based on

○ 授業計画 (Course schedule)

	単元の具体的な指導目標 Unit Objectives	指導項目・内容 Topic / Contents	評価規準 Evaluation Criteria	知 ❶	思 ❷	態 ❸	Alotted hours 配当時数
1学期（1st semester）	Students will be able to -choose an appropriate degree of accuracy and calculate measurements errors -understand and state the different properties of both exponential and logarithmic expressions and solve equations using these properties -understand the difference between an arithmetic and geometric sequence (and series) and, after comparing the two, apply the appropriate formulae to each -apply arithmetic and geometric sequences and series to financial applications -compare and contrast different types of functions and verify results -model real-life problems using differrent functions ・understand the concept of Voronoi diagrams and solve problems with applications in economics and geography ・use different functions: linear, quadratic, cubic, piecewine defined, exponential and logarithmic, trigonometric to model real-life phenomena ・understand operations with matrices, then model and solve real-life problems	・Approximation, prercentage errors ・Exponentials and Logarithms ・Sequences and Series ・Functions and their Graphs ・Voronoi Diagrams ・Modeling with Functions ・Matrices	❶【Knowledge/Skills】 ・Recall, select and use their knowledge of mathematical facts, concepts and techniques in a variety of familiar and unfamiliar contexts. ・Use technology accurately, appropriately and efficiently both to explore new ideas and to solve problems. ❷【Ability to think/make judgements/express themselves】 ・Recall, select and use their knowledge of mathematical skills, results and models in both abstract and real-world contexts to solve problems. ・Transform common realistic contexts into mathematics; comment on the context; sketch or draw mathematical diagrams, graphs or constructions both on paper and using technology; record methods, solutions and conclusions using standardized notation; use appropriate notation and teminology. ・Construct mathematical arguments through use of precise statements, logical deduction and interference and by the manipulation of mathematical expressions. ・Investigate unfamiliar situations, both abstract and from the real world, involving organizing and analyzing information, making conjectures, drawing conclusions, and testing their validity. ❸【Attitude towards learning proactively】 ・Be interested in mathematics, recognize the advantages of mathematics, and try to apply them to both abstract and real-world contexts to solve problems.	○	○	○	80
	定期考査 Examination			○	○		2
2学期（2nd semester）	Students will be able to -understand operations with matrices, then model and solve real-life problems - learn how to solve problems with probabilities using Markov chains -learn about vestors in two and three dimentions -learn vector applications in kinematics -understand the concept of graphs and how to use matrices to solve problems with graphs -learn a range of algorithms in graphs, allowing to find a shortest route and other graph related problems ・understand the concept of limits, they will compare and contrast a range of functions to determine which differentiation rules should be used ・apply the different differentiation techniques to find the key points in a graph and then draw an appropriate function graph either by hand or with the use of a GDC ・understand integration as the opposite process of differentiation and calculate integrals by hand and using technology	・Matrices ・Markov Chains ・Vectors ・Graph Theory ・Differential Calculus ・Integral Calculus	❶【Knowledge/Skills】 ・Recall, select and use their knowledge of mathematical facts, concepts and techniques in a variety of familiar and unfamiliar contexts. ・Use technology accurately, appropriately and efficiently both to explore new ideas and to solve problems. ❷【Ability to think/make judgements/express themselves】 ・Recall, select and use their knowledge of mathematical skills, results and models in both abstract and real-world contexts to solve problems. ・Transform common realistic contexts into mathematics; comment on the context; sketch or draw mathematical diagrams, graphs or constructions both on paper and using technology; record methods, solutions and conclusions using standardized notation; use appropriate notation and teminology. ・Construct mathematical arguments through use of precise statements, logical deduction and interference and by the manipulation of mathematical expressions. ・Investigate unfamiliar situations, both abstract and from the real world, involving organizing and analyzing information, making conjectures, drawing conclusions, and testing their validity. ❸【Attitude towards learning proactively】 ・Be interested in mathematics, recognize the advantages of mathematics, and try to apply them to both abstract and real-world contexts to solve problems.				80
	定期考査 Examination			○	○		2

	単元の具体的な指導目標 Unit Objectives	指導項目・内容 Topic / Contents	評価規準 Evaluation Criteria	知 ❶	思 ❷	態 ❸	配当 時数
3学期（3rd semester）	Students will be able to -calculate integrals by hand and using technology - learn how to find areas and volumes of revolution using integration as well as solve kinematics - learn first order differential equations by separating variables -learn about modeling real-life situations with differential equations and learn to solve them by Euler's method - understand the meaning of the complex numbers in different forms -perform calculations with numbers consisting of real and imaginary parts ・confirm their knowledge and understanding of statistics and apply this knowledge to calculate various examination style questions ・state the laws of probability and deduce the probability of certain events based on the information provided ・learn how to model real-life situations using different probability distributions	・Integral Calculus ・Differential Equations ・Complex Numbers ・Basic Statistics ・Basic Probability ・Probability Distributions	❶【Knowledge/Skills】 ・Recall, select and use their knowledge of mathematical facts, concepts and techniques in a variety of familiar and unfamiliar contexts. ・Use technology accurately, appropriately and efficiently both to explore new ideas and to solve problems. ❷【Ability to think/make judgements/express themselves】 ・Recall, select and use their knowledge of mathematical skills, results and models in both abstract and real-world contexts to solve problems. ・Transform common realistic contexts into mathematics; comment on the context; sketch or draw mathematical diagrams, graphs or constructions both on paper and using technology; record methods, solutions and conclusions using standardized notation; use appropriate notation and teminology. ・Construct mathematical arguments through use of precise statements, logical deduction and interference and by the manipulation of mathematical expressions. ・Investigate unfamiliar situations, both abstract and from the real world, involving organizing and analyzing information, making conjectures, drawing conclusions, and testing their validity. ❸【Attitude towards learning proactively】 ・Be interested in mathematics, recognize the advantages of mathematics, and try to apply them to both abstract and real-world contexts to solve problems.				68
	定期考査 Examination			○	○		2

	総授業時数 Total hours	234