2011-2012 Departmental Description
MATHEMATICS

The Mathematics program at Uskudar American Academy is based on understanding. The aim of the program is to grow both analytical and technologically developed students, who enjoy learning mathematics, and questioning and investigation. The five-year high school program focuses on the continuous development of students' mathematical and geometric skills. This development is achieved using these skills: problem solving, communicating, reasoning, and making connections. Students are offered the opportunity to particpate in math contests at all levels, both in and out of school, in order for them to be able to compare themselves with their peers internationally. Students are encouraged to participate in numerous math contests in Turkey, the American Math Competition, and the Waterloo University math exams.

Teachers maintain student-centered classrooms, which may be a new experience for many students. While an active classroom is expected, excellent classroom management skills should be employed at the same time to make sure that a learning environment is maintained at all times. Collaboration amongst teachers within and without the department is expected. The department currently has 9 full-time mathematics teachers from the USA and Turkey.

COURSE DESCRIPTIONS

PREP MATH

Prep required course (2 periods)

Textbook: *College Algebra and Trigonometry* by Ratti

Prep Math is the introductory course of mathematics for incoming ÜAA students. The main objectives of the course are to learn or review the English vocabulary related to mathematics as well as to review and extend the math topics learned in elementary school. The course accommodates to students with a wide continuum of English language skills, from the beginner to the advanced.

Students will be introduced to the graphing calculator and will begin using the textbook they will use into Grade 11. Students will also be taught how to prepare excel spread-sheets along with some mathematical examples. They will use the website (www.esl4math.com) prepared for them, for practicing mathematics more.

Assessments are based on class participation and completion of homework, quizzes and exams. Assessment questions will include use of correct oral and written English mathematical terminology as well as algebra.

MATH 9 (ALGEBRA 2)

Grade 9 required course (4 periods)

Textbook: *College Algebra and Trigonometry* by Ratti

Math 9 (Algebra 2) is a 4-period per week required course that consists of the following topics: sets of numbers; algebraic expressions; single variable equations and inequalities; relations and functions; systems of linear equations and inequalities; absolute value; polynomials and factoring; exponents and radicals; complex numbers; quadratic equations; sets, bases, modular systems; binary systems; and assorted word problems.

Graphing calculators are used throughout the course. Web-based online homework is required throughout the year. The emphasis is on students developing mathematical skills by analyzing, solving and explaining graphs and problems. Students are encouraged to explain each step logically and in English.

Assessments are based on class participation and completion of online homework and worksheets, quizzes and exams. Assessment questions will include application of theorems and properties, proofs, use of correct English mathematical terminology, and understanding from a description

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GEOMETRY 9

Grade 9 required course (2 periods)

Textbook: Teacher prepared material

Geometry 9 is a 2-period per week required course in geometry, covering the topics of: the number line; the coordinate plane; the midpoint and distance formulas; vectors; angles formed with parallel lines and a transversal; angles in a triangle; linear functions and their graphs; polygons; triangle inequality; similar triangles; and three dimensional geometry.

Teacher developed materials are used rather than a textbook. Students are taught the proofs of the theorems used in class before applying. They will also have some hands on activities during class time.

Assessments are based on class participation and completion of homework, quizzes and exams. Assessment questions will include application of theorems and properties, proofs, use of correct English geometric terminology, and accurate drawing from a description.

MATH 10 (PRE-CALCULUS AND TRIGONOMETRY)

Grade 10 required course (5 periods)

Textbook: *College Algebra and Trigonometry* by Ratti

Math 10 is a 5-period per week required course consisting of the following topics: systems of linear equations and modeling; complex numbers; quadratic equations; functions and modeling; polynomial functions; properties and graphs of functions; exponents and logarithms; trigonometric functions and equations; right triangle trigonometry; applications of trigonometric identities in geometry; trigonometric addition formulas; polar coordinates and complex numbers; and linear and circular analytic geometry.

The graphing calculator is used throughout the course. Web-based online homework is required throughout the year. The aim of this course is to master polynomials, trigonometry and logarithms. Students are expected to ask and explain in English.

Assessments are based on class participation and completion of online homework and worksheets, quizzes and exams. Assessment questions will include application of theorems and properties, proofs, use of correct English algebraic terminology, and analyzing graphs.

MATH 11 (ADVANCED ALGEBRA AND LIMITS)

Grade 11 required course (4 periods)

Textbook: *College Algebra and Trigonometry* by Ratti and *Calculus* by Finney, Demana and Waits

Math 11 is a 4-period per week required course. It consists of the following topics: logic; combinatorics; probability; series and sequences; summation and product symbols; limits; special functions; and matrices and determinants.

The graphing calculator is used throughout the course especially in mastering the topic of functions, their graphs and in investigating the limits. Web-based online homework is required in both terms. The students are expected to be able to reason, justify, analyze, think critically, explain problems in English and use technology in different ways by the end of the course.

Assessments are based on class participation and completion of homework, quizzes and exams. Assessment questions will include understanding problems, deciding a strategy, solving and use of correct English, and graphing and analyzing graphs.

GEOMETRY 11

Grade 11 required course (3 periods)

Textbook: Teacher prepared material

Geometry 11 is a 3-period per week required course. The emphasis of this course is on students strengthening their deductive reasoning skills through the derivation of relationships within polygons and circles as well as by proving geometric theorems and properties. Students will apply Euclidean geometry in problem solving situations as well as reflect upon the connections that can be drawn within geometry.

The year begins with a quick review of the basic building blocks of Euclidean Geometry before progressing on to the postulates, definitions, properties and theorems connected with similarity, congruence, polygons, circles, areas, and three dimensional shapes. Analytic geometry is integrated throughout the year, where applicable.

Assessments are based on class participation and completion of homework, quizzes and exams. Assessment questions will include application of theorems and properties, proofs, use of correct English geometric terminology, and accurate drawing from a description.

MATH 12 (AP CALCULUS AB)

Grade 12 required course (4 periods)

Textbook: *Calculus* by Finney, Demana and Waits

AP Calculus AB is a four period course in grade 12. ÜAA has an approved AP Calculus AB curriculum, and it is in this course that this program will now be offered. Derivatives, integrals and vectors will be the three main topics of this course.

Students with a strong interest in mathematics are encouraged to enter the AP Calculus AB or BC exam in May. If they receive a 5/5 on the AP Calculus AB exam are waived from taking Math at Koç University. Most universities in the USA accept high AP results in lieu of taking the Introductory Calculus course. This course is also essential for students entering the "Sayısal" portion of the LYS as well as for any student who will be continuing with any mathematics course in university.

Assessments are based on class participation and completion of online homework and worksheets, quizzes and exams. Assessment questions will include deriving derivatives and integrals as well as applying the rules. AP Calculus AB exam type of questions will be asked in the assessments.

ANALYTIC GEOMETRY

Grade 11/12 elective course (2 periods)

Textbook: Teacher prepared material

Analytic Geometry is a two hour elective that can be taken in either grade 11 or grade 12. Analytic Geometry examines the properties and theorems of geometry on the Cartesian coordinate plane. The major topics are drawn from linear, circular analytic geometry and conics as that are included in both the YGS and LYS exams as well as needed for a fuller understanding of mathematics.

Even though many of these topics are already included in the normal ÜAA math and geometry syllabi, this course will review, integrate and apply learnings in some new areas. For this reason Analytic Geometry is **strongly recommended** for students entering the Turkish university exam system as well as for students who have a love of mathematics.

Assessments are based on class participation and completion of homework, quizzes and exams. Assessment questions will include application of theorems and properties.

GEOMETRY 12

Grade 12 elective course (2 periods)

Textbook: Teacher prepared material

Geometry 12 is a two period elective in grade 12. After reviewing the grade 11 geometry topics, students will work on three dimensional geometry and vectors . In this course, the students will master the geometry topics needed for the YGS and LYS. Students who want to improve their geometry skills are encouraged to take this course.

Assessments are based on class participation and completion of homework, quizzes and exams. Assessment questions will include application of theorems and properties.

GRADING

According to the Turkish Ministry of Education guidelines, any class meeting three or more periods per week must set a minimum of three (3) written grades. These will mainly be tests (processed and written examinations). Any class which meets two periods per week is required to set a minimum of two (2) written grades. In addition, courses have oral grades which reflect class participation, quizzes/homework, oral presentations, and the use of English.

COURSE PREPARATION

Students are expected to attend class prepared with the required materials and completed assignments. Maintaining a homework or assignment book is recommended to avoid missing an exercise or assignment. All courses require class materials that are outlined in the course description given to students the first week of school. Students are expected to participate and share ideas with the class in a courteous and open manner. Students are encouraged to solve problems related to the topics, in addition to the assigned class work. Students are expected to speak only English in any level with their teachers all the time. Turkish is never to be spoken in class.

TERM HOMEWORK/PROJECTS

The Turkish Ministry of Education requires each student to complete a term homework project in one course in all grades. There are projects suggested by the teachers of the math department or the students may propose any other ideas. Students follow the designated guidelines and format for the project. Time spent on the project is spread throughout the six months of work. The project submitted should be an example of the student's ability, ideas, and originality.

TECHNOLOGY

All students own a graphing calculator (TI 83, TI83+, TI84, TI84+). They are allowed to use their calculators in all math exams but not in geometry. Calculators are also used as a teaching device in the math lessons. Each teacher is given a graphing calculator to use in their lessons.
All the math classrooms have smartboard technology. Each teacher has a laptop and all the lesson plans are done using the smart notebook software program. The lessons are taught using the smart boards. Students do their homework online using MathXL. Teachers use the gradebook in that website for grading homework.

GENERAL INFORMATION

Mathematics teachers are provided with a laptop computer, equipped with Microsoft Office, for their use. The laptops can be connected to the LCD projectors in the classroom ceilings for projecting lessons and films onto the wall. Classrooms are equipped with interactive white boards (smart boards). Supplementary materials such as DVDs, videos and audiocassettes, as well as cassette/radio/ CD players, and printers are located in the mathematics office. Other responsibilities include attending department and weekly level meetings, writing curriculum, holding office hours, covering for colleagues' absences, and becoming an active team member.

SPONSORED CLUBS

Every member of the faculty is expected to participate in the extra-curricular life of the school. The members of the Mathematics Department are involved with a number of clubs. The Math Olympiads club is one of these. In addition, members of the department are involved with the Mind Games, Memoranda, Funcook, Destination and Imagination, Hiking clubs.

Members of the Mathematics Department may choose to sponsor non-foreign language related clubs and activities which include Book Club, Drama, Photography, Yearbook, Prep Football, and Chess among others.