V. Kadın Matematikçiler Derneği Çalıştayı

Bildiri Özetleri

Matematik Bölümü
Dicle Üniversitesi

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Kadın Matematikçiler Derneği (TKMD) Çalıştayları, Türkiye' de bir grup kadın matematikçinin 2012 yılında kurmuş olduğu Kadın Matematikçiler Derneği tarafından 2014 yılından bu yana her yıl düzenli olarak yapılan bir sempozyumdur. Bu çalıştayların amacı, kadın araştırmacıların, yüksek lisans ve doktora öğrencilerinin araştırma konularını, fikirlerini ve tecrübelerini paylaşabilecekleri bir platform oluşturmaktır.

TKMD çalıştaylarının birincisi Gebze Yüksek Teknoloji Enstitüsü' nün (2014), ikincisi Sivas Cumhuriyet Üniversitesi' nin (2015), üçüncüsü de Dokuz Eylül Üniversitesi' nin (2016) ve dördüncüsü Orta Doğu Teknik Üniversitesi'nin Matematik Bölümlerinin evsahipliğinde gerçekleşmiştir.

Beşinci TKMD çalıştayına evsahipliği yapmayı kabul eden Dicle Üniversitesi, Matematik Bölümü' ne teşekkür ediyoruz.

Çalıştayımızda, üç ana konu başlığı altında çağrılı konuşmalara ve sunumlara yer veriyoruz. Beşinci çalıştay; Analiz, Uygulamalı Matematik/İstatistik,ve Topoloji alanlarında konuşmalara ayrılmıştır. Çalıştayda yer alan konuşma özetlerini, soyadı sırasına göre elinizdeki kitapçıkta bulabilirsiniz.

Son olarak, bu çalıştayın gerçekleşmesinde emeği bulunan Bilim Kurulu üyelerine, Düzenleme Kurulu' nda yer alan Dicle Üniversitesi, Matematik Bölümü akademik personeline özverili çalışmalarından dolayı teşekkür ediyoruz.

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Modeling the Dynamics of HIV-1 Decline in Patients on Protease Inhibitor Monotherapy

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Mathematical models shed light on the dynamics of HIV-1 infection in vivo. In this talk, we generalize one of the early models of the dynamics of HIV-1 introduced by Perelson et al. on a nonempty closed subset of real numbers, a so called time scale. We first calculate the total concentration of plasma virions on different time scales and then compare all these models to data obtained from patients. Data we use here is permitted by Perelson. In order to achieve our goal, we use MathLab with nonlinear least squares method, estimate parameters such as the virion clearance rate and the rate of loss of infected cells, and calculate adjusted R-squared values of the total concentration of plasma virions on different time scales. We also discuss the results from the fit of the total viral concentrations when the unit of time is in days and in hours. This is joint work with Gulsah Yeni.

Keywords. Time scales, HIV, dynamic equations, difference equations, systems..

Two-Dimensional Optical Solitons in PT Symmetric Lattice

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In this talk, I will discuss the existence of optical solitons supported by cubic-saturable nonlinearity, in the framework of nonlinear Schrödinger equation with PT symmetric lattice with defects by using the pseudo-spectral renormalization method. The idea behind the spectral renormalization method is to transform the governing equation into Fourier space and find a nonlinear nonlocal integral equation coupled to an algebraic equation and determine a convergence factor based upon the degree (homogeneity) of a single nonlinear term. The convergence factor can not found explicitly from the governing equation for saturable case by the use of the spectral renormalization method. In order to find the convergence factor, the root finding code has to be used such as the Newton method but if we use the pseudo-spectral renormalization method the convergence parameter is found from the governing equation explicitly. The pseudo-spectral renormalization method can efficiently be applied to a large class of problems including higher order nonlinear terms with different homogeneities. In the first part of my talk, I will present the pseudo-spectral renormalization method for cubic-saturable nonlinearity. I report the existence and stability of the optical solitons in parity-time PT symmetric lattice with defects in focusing/defocusing cubic-saturable media. The propagation of light beams along the z–axis of the medium composed from alternating domains with cubic and saturable nonlinearities is described by nonlinear Schrödinger equation (NLSE) with the external potential

$$i\frac{\partial u}{\partial z} + \frac{\partial^2 u}{\partial x^2} + \frac{\partial^u}{\partial y^2} + \sigma \frac{|u|^2 u}{1 + \alpha |u|^2} + V(x,y)u$$

Saturation paramater $\alpha = 0$ and $\alpha = 1$ correspond to the cubic domain and the saturable domain respectively. I will consider two different configuration. I will investigate the linear and nonlinear stability properties of the lattice solitons in PT symmetric lattice in two different configuration. It is found that for PT symmetric lattice the solitons suffer collapse in the cubic domain. I will discuss the stability properties of the optical solitons in the cubic and saturable domain with PT symmetric lattice.

Keywords. Optical solitons

Analizde integral Dönüşümlerin kullanımı

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İki yüzyıldır matematik, fizik ve mühendislik problemlerinin cözümünde integral dönüşüm yönteminden yararlanılmaktadır. Matematikte yaygın kullanım alanı bulm uş integral dönüşümler, Laplace ve Fourier dönüşümleridir. Bu sunumda, integral dönüşümlerinin kısa tarihçesi verildikten sonra genelleştirilmiş integral dönüsümleri tanıtılacaktır. Genelleştirilmiş Laplace, Hankel, Widder ve Stieltjes gibi dönüşümler arasında elde edilecek Parseval–Goldstein türü bağıntılar aracılığı ile integral tablolarının genişletilebileceği anlatılacaktır. Ayrıca genelleştirilmiş integral dönüşümlerinin bayağı ve kısmi türevli denklemleri içeren denklemlerin çözümünde kullanımları ndan örnekler sunulacaktır.

Keywords: Integral dönüşümleri.

Topology and Data

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We will give a short overview of concepts and methods from topological data analysis (TDA) that are used in the analysis of different types of datasets. A dataset is typically presented as a point cloud, that is, a finite set of points in some euclidean space of possibly high dimension. The underlying idea of TDA is that the shape of the point cloud provides useful insight into the properties of the data. Shape is described and analysed using the mathematical framework of algebraic topology. The main tool used in TDA (as well as the main contribution of TDA to the field of algebraic topology) is persistent homology. Persistent homology allows analysing the data at varying resolutions, and at the same time provides a clear and intuitive description of its shape.

Keywords. topological data analysis, algebraic topology.

Integral Boundary Value Problem For Intuitionistic Fuzzy Partial Differential Equations

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This paper presents some new results on the existence and uniqueness of intuitionistic fuzzy solutions for some classes of intuitionistic fuzzy partial differential equations with integral boundary conditions using the theorem of fixed point. This is joint work with Lalla Saadia Chadli and Said Melliani.

Keywords. Keyword1/Intuitionistic Fuzzy Solutions, keyword2/Integral Boundary Condition, keyword3/Partial Differential Equations.

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GOTTLIEB POLYNOMIALS IN SEVERAL VARIABLES

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The present study deals with some properties for the Gottlieb polynomials in several variables. The results obtained here include various families of multilinear and multilateral generating functions, miscellaneous properties and also some special cases for these polynomials. In addition, we derive a theorem giving certain families of bilateral generating functions for the Gottlieb polynomials in several variables and the generalized Lauricella functions. Finally, we get several interesting results of this theorem. This is joint work with Esra Erkuş-Duman.

Keywords. Gottlieb polynomials, generating function, multilinear and multilateral generating function, recurrence relations, hypergeometric function, Lauricella function.

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Stability Analysis of DRBEM

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In this study, we investigate first the stability analysis of the general initial value problem $\frac{du}{dt} = f(t; u)$, and then extend the investigation for the natural convection flow of nanofluids. The stability characteristics of this general first order differential equation in time and the transient fluid flow equation are going to be similar. The reason for this is the situation that DRBEM reduces these flow equations to the systems of first order differential equations in time. The difference lies in the unknown vector which contains both the problem solution and its normal derivative. The stability analysis is modified for the system of initial value problems resulted from the DRBEM application to the natural convection flow of nanofluids. The results will be given in terms of tables discussing the maximum eigenvalues of the coefficient matrices with respect to the variables of the problems such as time increment and relaxation parameters. This is joint work with Munevver Tezer.

Keywords. Stability analysis, DRBEM, Natural convection

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Overtwisted Contact Surgeries

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After a brief introduction on contact 3-manifolds and knots in contact 3-manifolds, we will focus on an operation called topological Dehn surgery and its contact analogue, contact surgery. We will discuss when contact $(+1/n)$–surgeries result in overtwisted contact 3-manifolds. This work is supported by TÜBİTAK Project No 115F519.

Keywords. contact structure, Legendrian knot, contact surgery.

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A Stochastic Binary Opinion Model

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With the development of technology and growth of social networking among individuals, the quantitative study of social dynamics has attracted a great interest from researchers. In this study, we propose a stochastic binary opinion model where agents are considered to hold an opinion of "yes" or "no" at each moment. In this model, the number of agents with opinion "yes" at time t is considered to be a birth-death process, and the configuration of the opinions at each moment is determined by a probability distribution. The rate an agent changes his/her opinion depends on the influence of the group's current state on the agent, given with a social-impact function, and a scalar self-motivation coefficient. We analyze the stationary probabilities with regard to the social-impact function and the self-motivation coefficient. We present numerical results showing the cases of the dominance of an opinion as well as of balanced opinions. This is joint work with Muruhan Rathinam.

Keywords. Social dynamics, stochastic models, asymptotic analysis.

Algorithms for multicurves from Dynnikov coordinates

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Multicurves have played a fundamental role in the study of mapping class groups of surfaces since the work of Dehn. A well known way to describe such systems is to use Dehn–Thurston coordinates. In the case where the surface is an n-punctured disk D_n, a particular beautiful way to describe multicurves is achieved by the Dynnikov coordinate system, which provides an explicit bijection from the set of multicurves on D_n to $\mathbb{Z}^{2n-4}\backslash\{0\}$. When $n = 3$, the Dynnikov coordinates of a multicurve consists of a pair of integers, and the number of connected components of the multicurve is the greatest common divisor of these integers. No analogous formula is known when $n \geq 4$. In this talk, we shall describe two polynomial time algorithms to calculate the number of connected components of a multicurve from its Dynnikov coordinates. This will yield a solution, for the genus zero case, a long standing conjecture which asks for the existence of a polynomial time algorithm that determines whether or not a given multicurve is connected from its coordinates. Then, we shall give a polynomial time algorithm to calculate the geometric intersection number of two multicurves from their Dynnikov coordinates making use of Cumplido's relaxation algorithm for multicurves. This is joint work with Toby Hall.

Keywords. Dynnikov coordinates, multicurves, geometric intersection

Topology of Real Schlafli Six-Line Configurations on Cubic Surfaces and in $\mathbb{RP}^3$

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A famous configuration of 27 lines on a non-singular cubic surface in $\mathbb{P}^3$ contains remarkable subconfigurations, and in particular the ones formed by six pairwise disjoint lines. We study such six-line configurations in the case of real cubic surfaces from topological viewpoint, as configurations of six disjoint lines in the real projective 3-space, and show that the condition that they lie on a cubic surface implies a very special property of *homogeneity*. This property distinguish them in the list of 11 deformation types of configurations formed by six disjoint lines in $\mathbb{RP}^3$. This is joint work with Sergey Finashin.

Keywords. Schläfli double sixes, configurations of skew lines/ayrık doğru konfügürasyonları.

New Morrey subspaces

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In this study we deal with some new subspaces of Morrey spaces which has some "vanishing type" conditions. Consequently we prove the boundedness of some classical operators in these new Morrey subspaces. This is joint work with Bilal Çekiç and Alexandre Almedia.

Keywords. Morrey spaces/ Morrey subspaces/ sublinear operator/

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An Alternative Proof of the Generalized Matsumoto Relation

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There is a relation in mapping class group of a closed, orientable genus-2 surface, containing 8 Dehn twists, known as Matsumoto Relation. This relation is generalized by M. Korkmaz to any genus-g surface, in the mapping class group of a closed orientable genus-g surface. We give an elementary proof of this generalized Matsumoto relation, by only using well known relations between Dehn twists. This is joint work with Elif Medetoğulları and Mehmetcik Pamuk.

Keywords: Dehn twist, mapping class group

On Some Structures of Fuzzy Soft Sets

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In this work some properties of fuzzy soft topological spaces are investigated. Ditopologies of fuzzy soft sets are developed and some new results are obtained.

Keywords. fuzzy soft set, fuzzy soft topological spaces

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The Torelli Group and The Johnson Homomorphism

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Let $\Sigma_{g,1}$ be a compact oriented surface of genus g with one boundary component and $\mathcal{M}(\Sigma_{g,1})$ be its mapping class group. The Torelli group $\mathcal{I}(\Sigma_{g,1})$ is the normal subgroup of $\mathcal{M}(\Sigma_{g,1})$ acting trivially on $H_1(\Sigma_{g,1}; \mathbb{Z})$. In [1], Johnson defined a surjective homomorphism

$$\tau : \mathcal{I}(\Sigma_{g,1}) \to \bigwedge^3 H_1(\Sigma_{g,1}; \mathbb{Z}),$$

which is called the Johson homomorphism. In this talk, we will introduce the Torelli group and give some basic properties, [2]. We will also talk about the Johnson homomorphism and its importance for the Torelli group.

Keywords. The Torelli group, the Johnson homomorphism.

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1

Nonexistence of Global Solutions for Viscoelastic Equations with Arbitrary Initial Energy

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In this talk we consider the initial boundary value problem for the viscoelastic equations with weak damping terms. We prove global nonexistence of solutions for the viscoelastic equations under some conditions. This type of problem has been considered by many authors before, and several results concerning local and global existence, blow up and asymptotic behaviour have been established ([1, 2, 3, 4, 5]). This is joint work with Erhan Pişkin.

Keywords. Global nonexistence, Viscoelastic equations, Arbitrary initial energy

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Blow-up process for surfaces and the weak curve lifting property for coverings

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Let $Mod(S)$ denote the mapping class group of a surface S. The Birman-Hilden property given in [1] relates $Mod(S)$ and $Mod(\tilde{S})$ where $p : \tilde{S} \to S$ is a branch covering of surfaces. Winarski in 2015 gave a property which is called the weak curve lifting property and proved that when a covering p satisfies the Birman-Hilden property then it has the weak curve lifting property ([2]). In this short talk, I will define blow-up process and analyse the weak curve lifting and the Birman-Hilden property under blow-up process. This is joint work with Ferihe Atalan.

Keywords. Mapping class group, branch covers of nonorientable surfaces, covering spaces

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Generalized Dynnikov Coordinates on Higher Genus Surfaces

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Disjoint unions of essential simple closed curves on a given surface are usually described by Dehn-Thurston or train track coordinates. In 2006, Dynnikov introduced an alternative way to describe such systems on the finitely punctured disk D_n, which is much more advantageous to study combinatorial problems regarding curves on surfaces. In this talk, I will describe triangle coordinates for integral laminations on an orientable surface $\sum_{b,n}^{g}$ of genus g with finitely many punctures and one boundary component, and talk about some attempts to construct the generalized Dynnikov coordinate system on $\sum_{b,n}^{g}$. This is joint work with Mehmetcik Pamuk, Semra Pamuk and S. Öykü Yurttaş.

Keywords. Dynnikov coordinates, integral laminations, surfaces.

1

An Optimal Estimator in Logistic Regression Model

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The logistic regression model is used to predict a binary response variable. In this study, an optimal method is proposed to construct a biased linear estimator for logistic regression, when the data are collinear, which is based on the minimization of relative mean squared error. Furthermore, this optimal method and ordinary least squared estimator method are compared under the mean squared error criterion. This study provides theoretical results about the performance of an optimal Logistic estimator. This is joint work with Demet Güngörmez.

Keywords. Optimal Estimator, OLSE, MSE criterion, Logistic Regression, Collinearity.

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1

Measure Theory For Nabla Time Scale Calculus

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This study is mainly a survey, based on the measure theory developments regarding the time scale calculus. The work of Asli Deniz [1] was mainly about the measure theoretical results of Δ-time scales calculus. In addition, some notions about the ∇-measure theory were defined in [2] and [3]. In our work, the measure theory concepts for nabla time scale calculus are explained and the Lebesgue ∇-integral in an arbitrary time scale $\mathbb{T}$ is developed. In the literature, although there are some results about ∇-measure theory on an arbitrary $\mathbb{T}$, they are not as detailed as those of the Δ- measure theory. The main aim of this study is to explain this issue in detail so further study can be developed.

Keywords. measure theory, ∇-time scale calculus, legesgue ∇-integration.

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Legendrian Torus Knots

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In this talk, first we will give definiton and examples of torus knots. We will explain contact structures on 3-manifolds. Then, we will define Legendrian knots in contact 3-manifolds.Finally, we will talk about the classification theorems of Legendrian torus knots. This work is a part of my master's thesis and is supported by TÜBİTAK 1001-11F519.

Keywords. Torus knots, contact structure, contact manifolds, Legendrian knots, Legendrian torus knots.

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Open Book Decompositions and Contact Structures

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In this talk, first we will give some basic definitions, examples and theorems about open book decompositions and contact structures on 3-manifolds. Then we will present the relation between open books and contact structures, [1,2,3]. This work is a part of my master's thesis and is supported by TUBITAK 1001-115F519.

Keywords. Open book, contact structure, positive stabilization.

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Mayer-Vietoris Sequence for Persistent Homology

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Persistent homology is an algebraic method to determine features of a topological space or a data set by using filtration which comes from a suitable function on it. Persistent homology is worked in detail for the usual homology and cohomology groups(with coefficients from a field) of finite cell complexes. The persistence of more general algebraic invariants of topological spaces is not yet well understood. Moreover, it is not clear that whether the methods to determine classical algebraic invariants work for persistent homology. One of them is the Mayer-Vietoris sequence which allows one to study the homology groups of a given space in terms of simpler homology groups of its subspaces.

In this talk, we will show that the Mayer-Vietoris sequence is not exact if we are working with the persistent homology groups. To explain that, we will give an example for which the Mayer-Vietoris sequence is not exact. However, we will show that the Mayer-Vietoris sequence is exact when we use the persistent modules instead of the persistent homology groups. This is joint work with Hanife Varlı and Mehmetcik Pamuk.

Keywords. Persistent homology, Mayer-Vietoris sequence, perfect discrete Morse function, persistence module.

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Existence and Nonexistence of Solutions of Timoshenko Beam Equation

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This talk about beam theory. Firstly, we derive mathematical modeling of Timoshenko equation. Later, we established the existence and nonexistence of solutions Timoshenko equation. This type equation arises beam theory. Timoshenko [1], a pioneer in strength of materials, developed a theory in 1921 which is a modification of Euler's beam theory. The modified theory is called the Timoshenko beam theory. Many authors studied Timoshenko equation [2, 3, 4, 5]. This is joint work with Erhan Pişkin.

Keywords. Timoshenko equation, Existence, Nonexistence

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5 Mayıs 2018 (Cumartesi)	
09:30-10:30	*Kayıt*
10:30-11:20	*Açılış*
11:20-12:10	**Moderatör:** H.Özlem Güney
	Neşe Dernek	Çağrılı Konuşma
12:20-14:30	*Öğle Yemeği Arası*
14:30-15:20	**Moderatör:** Billur Kaymakçalan
	Elvan Akın	Çağrılı Konuşma
15:20-15:50	Serap Tay Stamoulas
15:50-16:10	*Çay Kahve Arası*
16:10-16:40	Bouchra Ben Amma
16:40-16:50	Tuğba Han Dizman
16:50-17:00	Elif Dalyan

6 Mayıs 2018 (Pazar)	
09:30-10:20	**Moderatör:** Belgin Korkmaz
	Neza Mramor Kosta	Çağrılı Konuşma
10:20-10:40	*Çay Kahve Arası*
10:40-11:10	S. Öykü Yurttaş
11:10-11:20	Elif Medetoğulları
11:20-11:30	Hatice Ünlü Eroğlu
11:30-11:50	*Ara*
11:50-12:00	Yağmur Yılmaz
12:10-12:20	Yasemin Yıldırım
12:20-14:00	*Öğle Yemeği Arası*
	Moderatör: S. Öykü Yurttaş
14:00-14:50	Nalan Antar	Çağrılı Konuşma
14:50-15:00	*Ara*
15:00-15:30	Nejla Özmen
15:30-15:40	Hazal Yüksekkaya
15:40-15:50	Ayşe Fidan
	Çay Kahve Arası
16:10-16:40	Sinem Çelik Onaran
16:40-16:50	İrem Özge Saraç
16:50-17:00	Nurkut Nuray Urgan
17:00-17:10	Nesliye Pelen
18:00-21:00	*Akşam Yemeği*

7 Mayıs 2018 (Pazartesi)	
	Moderatör: Semra Pamuk
09:30-10:00	Arzu Zabun
10:00-10:30	Sevin Gümgüm
10:30-10:50	*Çay Kahve Arası*
10:50-11:00	Ayşegül Çelik Alabalık
11:10-11:20	Alev Meral
11:20-12:00	*Kapanış*
12:00-12:30	*Çay Kahve Arası*
13:00-17:00	*Gezi*