



Karadeniz Technical University

2nd Year Specialization Area:

Ecosystem based multill

est management planning"

Prof. Dr. Ertuğrul BİLGİLİ

KTU: Karadeniz Technical University Trabzon, TURKEY

MEDfOR Online Meeting, 2022

Turkey is in the First 10 in the World in Receiving International Students to Higher Education

As of 2018 data published by the United Nations Educational, Scientific and Cultural Organization (UNESCO), it became the 10th country in the world with the highest number of international students in higher education with 125,138 students.

According to UNESCO 2018 data, 987,314 out of 5,571,402 international students in the world study at higher education institutions in America. America was followed by England with 452,079 students and Australia with 444,514 students, respectively.

According to UNESCO's 2018 data, the top 10 countries in the world that attract the most international students are as follows:

1. USA	987,314
2. England	452,079
3. Australia	444,514
4. Germany	311,738
5. Russia	262,416
6. France	229,623
7. Canada	224,548
8. Japan	182,748
9. China	178,271
10. Turkey	125,138





Karadeniz Technical University



The first university in Turkey established outside metropol 1955, 4th across the country. (207 Universities)





12 faculties 32,233 students (2021) 128,829 alumni (2021) 1,453 foreign students from 93 different countries (2021)



Karadeniz Technical University



Koru Erasmus Dormitory,

You will stay here.







Single room =75 €/month

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Faculty of Forestry One of the leading faculties (12) in Turkey, has 4 departments:

□ Forest Engineering - Forest Resources

Forest Industrial Engineering

Landscape Management

UVIId Life Management







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Department of Forest Resources 8 sub department (Forest management, forest protection, silviculture, forest botany...)

□ 16 Prof., 9 Assoc. Prof., 4 Asst. Prof., 16 Res. Asst. (45 academic staff)

Nearly 80 students register each year

Management practicum in different ecosystems

Research forest (6,000 ha)

8 Labs: soil, silviculture, genetic, herbarium, entomology, dendrometry, computer, forest management,

High research interest and capacities in forest management

Pioneers the use of GIS in forestry and forest management

High profile in applied fire management and biodiversity in Medditerrenean region







EUR-ACE system



Accredited with ANEA-ACE Label











Karadeniz Teknik Üniversitesi **Orman Fakültesi**

Orman Mühendisliği (Normal Öğretim)

01 Mayıs 2015 - 30 Eylül 2017

tarihleri arasında geçerli olmak üzere MÜDEK tarafından akredite edilmiştir.



Mühendislik Eğitim Programları Değerlendirme ve Akreditasyon Derneği

Karadeniz Teknik Üniversitesi **Orman Fakültesi**

tarafından yürütülen Orman Mühendisliği (Normal Öğretim) Lisans Program

30 Eylül 2017 - 30 Eylül 2018 tarihleri arasında geçerli olmak üzere MÜDEK tarafından akredite edilmiştir.



Mühendislik Eğitim Programları Değerlendirme ve Akreditasyon Derneği

Karadeniz Teknik Üniversitesi **Orman Fakültesi** tarafından yürütülen

Orman Mühendisliği (Normal Öğretim) **Lisans Program**

30 Eylül 2018 – 30 Eylül 2020

tarihleri arasında geçerli olmak üzere MÜDEK tarafından akredite edilmiştir.

13. Janle Prof. Dr. A. Bülent Özgüler MÜDEK MAK Baskanı

30 Haziran 2018

Prof. Dr. Ramazan Vildurim MÜDEK Yönetim Kurulu Baskan 30 Haziran 2018

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The Focus...

Specialization area

"Ecosystem based multi-use forest management planning"

Contents

Integration of economic, ecologic and socio-cultural values into multiuse forest management planning

□ Using and developing tools to understand forest dynamics

Geo-Information science, remote sensing applications in forest management planning

Biodiversity integration

Fire management









Assoc. Prof. Uzay KARAHALİL

Forest Management Planning

Protected Area Management

Remote Sensing

GIS

Operations Research

Carbon Measurement

Using

Forest

Satellites

Images in

Ecosystems

Lecturer: Assoc. Prof. Uzay Karahalil h-index 9 i10-index 8

Contents

General information about natural resource satellites, LANDSAT/Sentinel

Resolution, definition of bands, combining bands and opening images.

Mosaicing, rectifying and cutting images

Image enhancement techniques, unsupervised/supervised classification

Case study: Supervised classification of Köprülü Canyon National Park







Estimating Stand Parameters Using Images and LIDAR Data







Kennedy KANJA (Zambia)



Inventory



S.P No	Area m ²	ea m² No. of Trees Dominant Av. Trees per ha Height Height m		Av. Height m	Total Volume	Volume per Ha	Shrub C.C %	Shrub Height	
				(m)		(m [*])			(m)
2	600	19	317	10.8	8.7	2.215	36.9	10	1.7
6	400	17	425	15.7	13.3	4.158	103.9	30	1
7	400	32	800	15.2	13.4	8.377	209.4	35	1.5
9	800	20	250	21.6	13.8	7.194	89.9	80	2
10	400	13	325	20.2	17.3	10.207	255.1	25	1.6-1.7
11	400	18	450	24.6	20.	10.077	251.9	40	1.3-1.4
13	800	6	75	14.4	9.92	1.531	19.1	10	3.5-4
16	600	12	200	15.4	12.7	5.509	91.8	100	3.5-4
21	800	8	100	31.1	25	12.888	161.1	5	0.7-0.8
23	600	13	217	20.1	16.1	13.15	219.1	0	0
24	600	10	167	20.2	15.4	16.872	281.2	65	1.6-1.7
25	800	26	325	28.5	21.5	10.193	127.4	40	1.7
26	800	14	175	18.4	15.3	8.803	110.0	10	1.3-1.4
27	400	14	350	16.1	12.2	6.621	165.5	30	1.5
28	400	31	775	15.2	11.9	5.965	149.1	35	1.5-1.6
29	400	40	1000	11.1	8.9	3.301	82.5	10	3
30	400	27	675	15.2	12.3	7.878	196.9	80	2.5-3
31	400	17	425	16.4	14.6	6.047	151.2	15	1
32	400	18	450	14.9	12	3.952	98.8	90	4-4.5
33	600	35	583	14.6	8.5	5.405	90.1	10	1.3
35	600	12	200	27.9	23.6	11.626	193.7	5	1.8-1.9
36	800	13	163	24	21.5	15.675	195.9	30	2.5-3
37	600	18	300	19.5	14.3	10.147	169.1	40	1.7
39	400	19	475	15.8	14.5	3.858	96.4	10	4-4.5
40	600	9	150	14	11.3	2.347	39.1	100	3.5-4
	000	~				0.000		~~	



No. of Contract of			and the second second second second second second second second second second second second second second second
	Mean	Minimum	Maximum
Tree height (m)	13.7	6.4	25.0
Dominant height (m)	17.0	8.7	31.1
Tree density (N/ha)	372	75	1750
Volume (m ³ /ha)	130.8	10.1	260.1
Crown closure of	39.2	0	100
shrubs(%)			
Height of shrubs (m)	2.0	0	4.5

Methods



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Results

Table 7. Dominant height regression model output

Regression St	atistics			·
Multiple R	0.918			
R Square	0.843			
Adjusted R Square	0.831			
Standard Error	1.881			
Observations	30			
ANOVA				
	df	SS	MS	F
Regression	2	512.591	256.295	72.420
Residual	27	95.554	3.539	
Total	29	608.145		
	Coefficients	Standard Error	t Stat	P-value
Intercept	2.909	1.114	2.612	0.015
3rd Q	1.500	0.178	8.448	0.000
10th P	-0.579	0.262	-2.207	0.036



0.000





Only LiDAR

	V(m3/ha)	N(adet/ha)	hq(m)	h _{üst} (m)
Düzeltilmiş R²	0,66	0,73	0,83	0,83
Hata	40,4	119	1,80	1,88



LIDAR+WV3

	V(m3/ha)
Düzeltilmiş R²	0,70
Hata	32,3

Lecturer: Assoc. Prof. Uzay Karahalil h-index 9 i10-index 8

Multiobjective Planning (Forest Dynamics & Modelling)



ContentsForest values and multiobjective programming problems

Multiobjective formulations (Focusing on Goal Programming)

Model buildings for few case study areas

□ Project work: development and presentations of sample For Mgtm models

Understanding the cause-effect relationships



Lecturer: Assoc. Prof. Uzay Karahalil h-index i10-index 8

Multiobjective Planning (Forest **Dynamics** and Modelling)



Contents

- General principles of forest dynamics; the relationships of tree, stand, habitat, ecosystem and forests
- Natural disturbances and management actions/treatments to be applied to forests
- Description of compositional and configuration of forest ecosystems
- Monitoring the spatio-temporal changes of forest ecosystems
- The effects of changes in spatial structure of forests and their relationships to forest management objectives
- Modelling forest management problems with linear programming
- Development of plan alternatives, model outputs, assessment of forest dynamics with performance indicators and comparison of various planning alternatives

Prof. Ertugrul Bilgili



- Ph.D., University of New Brunswick, Faculty of Forestry and Environmental Management, Canada.
- MScF, University of New Brunswick, Faculty of Forestry, Faculty of Forestry and Environmental Management, Canada

Research fields

- Forest protection
- Forest fires
- Fire behavior
- Fire risk&danger assessment
- Fire ecology
- Statistics / single tree Growth&Yield modeling
- Fire management



Lecturer: Prof. Ertugrul Bilgili

15

23

h-index

i10-index

Lecturer: Prof. Ertugrul Bilgili h-index 15 i10-index 23

Objectives of the Course

To acquaint students with the ecological modelling concept, modeling approaches and implications.

Contents of the Course

Concept of ecological modelling, modelling approaches, model applications in forestry, model development, model development principles, bounding, parsimony, flow chart, sensitivity analysis, and verification in modelling.





Ecological Modelling

Ecological

Modelling

Lecturer: Prof. Ertugrul Bilgili h-index 15 i10-index 23

Learning Outcomes

Report on the concept of ecological modeling in forest ecosystems.

Discuss modeling approaches and identify the key differences between them.

List the model development principles, define modeling terminology.

Develop a flow chart of a dynamic process and develop a simple dynamic model to simulate it.

Conduct sensitivity analyses and validate the models using independent data.

Report and present model results.



Lecturer: Prof. Ertugrul Bilgili h-index 15 i10-index 23

Sample Student Project

Development of a dynamic model for a deer population.



	B2	•	0	<i>f</i> _∗ Adul	t Deer Populati	on												
A	В	С	D	E	F	G	Н	1	J	К	L	M	N	0	Р	Q	R	S
		ī					The effect	of habitat qua	lity on deer popu	lation dynamic	:s							
	1	1			Survival rate	Summer	Survival rate		Survival rate	Winter	Survival rate	Winter	Rate of	Rate of	Rate of	Rate of		
	Adult Deer	Habita	t Birth	Number	through summer	Juvenile	through summer	Summer Adult	through winter	Juvenile	through winter	Adult	Predation	Predation	Hunting	Hunting	Population	Population
Yea	r Population	Quality	y rate, %	of fawn	Juvenile, %	Population	Adult, %	Population	Juvenile, %	Populaton	Adult, %	Population	Juvenile, %	Adult, %	Juvenile, %	Adult, %	Juvenile	Adult
	0 20	4	94,00	0,00	30,00		15,00		15,00		95,00		10,00	5,00	10,00	10,00		
	1 20,00	4	1,78	17,00	0,71	10,00	0,89	16,00	0,89	6,00	0,95	12,00	0,10	0,05	0,10	0,10	6,00	12,00
	2 18,00	4	1,78	16,00	0,71	9,00	0,89	15,00	0,89	7,00	0,95	12,00	0,00	0,00	0,10	0,10	7,00	12,00
	3 19,00	4						16.00	0.89	7.00	0.95	13 00	0.00	0,00	0,10	0,10	7,00	13,00
	4 20,00	4			Number	of fawn		17		Populatio	n luvenile				ام ۸		Donulati	
	5 21,00	4	70.00				_	18		opulation	lijuvenne				Au	uit Deer	Fopulati	on
	6 22,00	4	70,00					19 30			•			80				
	7 24,00	4	60,00			•	_	21 25			•			70			•	
	8 26,00	4	50,00			•		23 23			•			60				
	9 29,00	4	40.00			•		25 20		•				50			·	
1	0 32,00	4	40,00		******	•		28						50				
1	1 35,00	3	30,00				 Number of fav 	vn 29 15		** ******		 Population 	Juvenile	40				 Adult De
1	2 33,00	3	20.00				_	10	•••	• •				30				
1	5 50,00	3	•					22						20				
1	4 23,00 5 27.00		10,00				_	24 5						10				
1	5 27,00	7	0,00 🔶			1	-	26 0						0				
1	7 33.00	4	0	10	20	30	40	20 0	10	20	30 40			0	10	20	30 4/)
1	8 37.00	4	1.78	32.00	0.71	19.00	0.89	32.00	0.89	14.00	0.95	27.00	0.00	0.00	0.10	0.10	14.00	27.00
1	9 41,00	4	1,78	36,00	0,71	21,00	0,89	36,00	0,89	16,00	0,95	30,00	0,00	0.00	0,10	0,10	16,00	30,00
2	0 46,00	4	1,78	41,00	0,71	24,00	0,89	40,00	0,89	18,00	0,95	34,00	0,00	0,00	0,10	0,10	18,00	34,00
2	1 52,00	3	1,51	39,00	0,62	20,00	0,84	43,00	0,84	14,00	0,95	36,00	0,00	0,00	0,10	0,10	14,00	36,00
2	2 50,00	3	1,51	37,00	0,62	19,00	0,84	42,00	0,84	14,00	0,95	35,00	0,00	0,00	0,10	0,10	14,00	35,00
2	3 49,00	3	1,51	37,00	0,62	19,00	0,84	41,00	0,84	14,00	0,95	34,00	0,00	0,00	0,10	0,10	14,00	34,00
2	4 48,00	3	1,51	36,00	0,62	18,00	0,84	40,00	0,84	13,00	0,95	34,00	0,00	0,00	0,10	0,10	13,00	34,00
2	5 47,00	3	1,51	35,00	0,62	18,00	0,84	39,00	0,84	13,00	0,95	33,00	0,00	0,00	0,10	0,10	13,00	33,00
2	6 46,00	3	1,51	34,00	0,62	17,00	0,84	38,00	0,84	12,00	0,95	32,00	0,00	0,00	0,10	0,10	12,00	32,00
2	7 44,00	4	1,78	39,00	0,71	23,00	0,89	39,00	0,89	18,00	0,95	33,00	0,00	0,00	0,10	0,10	18,00	33,00
2	8 51,00	4	1,78	45,00	0,71	27,00	0,89	45,00	0,89	21,00	0,95	38,00	0,00	0,00	0,10	0,10	21,00	38,00
2	9 59,00	4	1,78	52,00	0,71	31,00	0,89	52,00	0,89	24,00	0,95	44,00	0,00	0,00	0,10	0,10	24,00	44,00
3	0 68,00	4	1,78	60,00	0,71	36,00	0,89	60,00	0,89	28,00	0,95	51,00	0,00	0,00	0,10	0,10	28,00	51,00



Ecological Modelling

Protecting

in Forest

Biodiversity

Ecosystems

Lecturer: Prof. Ertugrul Bilgili h-index 15 i10-index 23

Objectives of the Course

To enable students to understand the importance and role of biodiversity in the protection of forest resources.

Contents of the Course

Concepts of ecosystem and biodiversity, the structure and functions of different forest ecosystems, principle components of biodiversity, indicator, keystone, and flag species, habitats and biodiversity, patch Dynamics.







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Lecturer: Prof. Dr. Ertugrul Bilgili h-index 15 i10-index 23

Learning Outcomes

Define biodiversity and explain its importance.

Explain the structure and functions of different forest ecosystems.

Relate biodiversity to the well being of ecosystems.

Define indicator, keystone and flagship species and relate them to the protection, maintenance and survival of ecosystem components.

Explain the role of patch dynamics in the protection of biodiversity.

Evaluate and discuss the threats to biodiversity.

Calculate indexes of biodiversity (richness, evenness).

Report and present the findings before an audience.



Protecting Biodiversity in Forest Ecosystems

Lecturer: Prof. Ertugrul Bilgili h-index 15 i10-index 23

Student Project Sample

- Measurements of Biodiversity in Forest Ecosystems – Tree Species diversity

Protecting Biodiversity in Forest Ecosystems









Plot # 1



Plot # 2





Prof. Salih TERZİOĞLU



Research fields

- Forest Botany
- Plant species
- Plant biodiversity
- Non Wood Plant Products
- Biodiversity conservation





Principles of Identifying Vascular Plants

Objectives of the Course

This course aims to provide graduate student how they identify the vascular plant taxa and the prepareing the identification keys.

Contents of the Course

Vegetative and generative organs of Vascular plants (Spermotophyta (Gymnospermae, Angiospermae) and Pteridophyta)

Preparing identification keys and their usage in identifying plant taxa.

Plant association and plant sociology

Biodiversity and its components

□ Vegetation classification by: Braun-Blanquet, IUCN, EUNIS, Natura2000

Floristic list, characteristic species, habitats, minimal areas

Integration of biodiversity (flora) into forest management plans

Case study: Field work





Principles of Identifying Vascular Plants



Learning Outcomes

Understand different vegetative and generative organs of vascular plant taxa.

Use different plant identification keys (Multi-access, dichotomous etc.)

Identify the families of vascular plants.

Identify the living and/or herbarium materials of vascular plants.



h-index 16 i10-index 26

Lecturer: Prof. Salih Terzioglu

Lecturer: Asst. Prof. Derya MUMCU KÜÇÜKER

5

Contents

GIS, components and applications in forest management

Data-information, database management systems, spatial data, topology, vector and raster data models, and data quality.

i10-index

□ GIS functions of data input, reclassification, overlay, neighbourhood analysis and data display as applied to Mediterranean forests.

A practicum: five assignments in spatial database creation (cover type map) and spatial analysis of forest resources. ArcGIS



Concepts and Principles of GIS in Forestry



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Investigating the Transition Ratio of Changes in Selected Land Use/Land Cover Classes for Modelling

Results and Discussion

Another PU (Çaykara) Close to Case Study Area Transition Ratios (%)

		2010 Land Cover Type										
			en A,	Sp	ruce	F +	SP	Beec	h (C+A+O	Mixed	Degra d,
	Open Areas	$\left[\right]$	86,2		1,9		0,0	0	,4	1,0	5,9	4,7
/er	Spruce		11,9	ſ	55,1	_	0,0	0	,3	0,1	21,6	11,0
Õ	Fir + Scots Pine		11,9		15,4		0,2	0	,0	0,0	62,9	9,6
be	Beech		4,5		6,1	\neg	0,0	6	,5	2,9	71,5	8,4
71 Lar Ty	Chestnut + Alder + Oak		0,0		0,0		0,0	0	,0	0,0	0,0	0,0
197	Mixed		9,0		15,4		0,1	4	,3	2,1	59,4	9,6
	Degraded		22,0		9,1		0,2	1	,7	6,6	43,9	16,5

asses

- Open lands, agriculture residential area, mine, warehouse, roads, grave
- est It includes mixed productive (crown c
- Forest Forest which has been degraded or fai

Fagus orientalis

Castanaa satina





Remained the same as in the previous period



Other researchers...

Staff	Area of Expertise
Prof. Mahmut EROĞLU	Pest management
Prof. Hakkı YAVUZ	Growth and yield
Prof. Cantürk GÜMÜŞ	Forest Policy
Prof. Z. Cemal ÖZKAN	Dendrology
Prof. M. Fehmi TÜRKER	Forest economics
Prof. Ali Ömer ÜÇLER	Tree Improvement
Prof. İbrahim TURNA	Forest Renewal
Prof. Devlet TOKSOY	Forest economics
Prof. Bedri SERDAR	Wood Anatomy
Prof. Nuray MISIR	Growth and yield
Prof. Murat YILMAZ	Forest Ecology
Prof. Ömer KARA	Watershed Mngmt
Prof. Selçuk GÜMÜŞ	Transportation

Staff	Area of Expertise
Asoc.Prof. Sez.HACISALİHOĞLU	Watershed Mngemt
Asoc.Prof. Erhan ÇALIŞKAN	Transportation
Asoc.Prof. Dr. Zafer YÜCESAN	Silviculture
Ast.Prof. Dr. Arslan OKATAN	Range management
Ast.Prof. Dr. Sefa AKBULUT	Plant science
Ast.Prof. Dr. Saliha ÜNVER OKAN	Transportation
Ast.Prof. Dr. Oğuz KURDOĞLU	Social forestry
Ast.Prof. Dr. Mahmut BAYRAMOĞLU	Forest economics
Ast.Prof. Dr. Ercan OKTAN	Silviculture



Draft Thesis Topics -I Land use changes and their implications to forest management planning

Estimating some forest parameters using remote sensing

Integration of soil conservation/water production into forest management plans

Integration of carbon sequestration into forest management planning

Evaluation of forest dynamics under various management strategies in preparing forest management plans

The effects of various rotation periods on the performance of forest ecosystems

Integration of climate change into forest management plans



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Draft Thesis Topics -II

Preparing a spatially feasible forest management plans with GIS
 Management planning of industrial plantation with fast growing trees

Integration of fire management into forest management plans

Integrating plant diversity into forest management plans

TODE TO

Research activities

Ongoing projects...

- TÜBİTAK project Determining Carbon sequestration for pure and mixed Cremian Pine stands
- Erasmus+ Project: Developing Protocol for Carbon Storage Studies
- □ H2020: ALTERFOR; Alternative FMM, 21 Partners, 17 countries, 13 cases
- KTU Research Projects (KTU) Determing carbon storage for managed and protected Calabrian Pine stands
- GDF-AFD-ONFI-KTU Exploring the Adaptation Potential of Marmara Forests to Climate Change
- CEM-TUBITAK-KTU National Land Cover / Use Classification and Monitoring System (UASIS)



Our Graduate Students Juan MENACOSTA (MSc), Spain (Finished, 2016)-MEDFOR
 Kennedy KANJA (MSc), Zambia (Finished, 2016)

Sidra Ijaz KHAN (MSc), Pakistan (Finished, 2017)-MEDFOR

Ä

Sauti RAYMOND (MSc), Rwanda (Finished, 2019)

Elharith HAGR (MSc), Sudan (Finished, 2019)

Fosso CONSTANTIN (PhD), Cameroon

Moussa MBHOU (PhD), Cameroon

Sauti RAYMOND (PhD), Rwanda

113 Exploring Spatiotemporal Dynamics of Gölcük Planning Unit (43 Years) & Implications of International Convention Sidra Khan, Karadeniz Technical University-Medfor

 IV. Türkiye İklim Değişikliği Kongresi – TİKDEK'2017
 5-7 Temmuz 2017, İstanbul

 IV. Turkey Climate Change Congress - TCLCC'2017
 5-7 July 2017, İstanbul, Turkey

INTEGRATION OF CLIMATE CHANGE TO FOREST MANAGEMENT

PRACTICES: DRIVEN FACTORS AND CONCEPTUAL FRAMEWORK

Fosso Lionel Constantin¹, Uzay Karahalil²

Karadeniz Technical University Faculty of Forestry Department of Forest Engineering 61080 TRABZON

folionelc@yahoo.fr ; uzay@ktu.edu.tr







Last Semester - (2019 Fall)

Julia KACHANOVA (Russia)

Angham DAIYOUB (Syria)

Takele MULETA (Ethiophia)



Why KTU of Turkey?

Different landscape, ecosystems and culture to experience

Qualified academics and good infrastructure

Cozy campus life with different fields of research

Easy access and convenient place to live

University has ECTS label, diploma supplement and accreditation

Awarded with MÜDEK/ABET/EUR-ACE accreditation certificate

□Affordable (cheap) and beautiful to travel around



www.ktu.edu.tr/ofinafen

Asst. Prof. Uzay KARAHALİL: uzay@ktu.edu.tr

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Erasmus team to help you...

Mrs. Çiğdem HÜSEM Contact Person for Incoming Students

Phone: + 90 462 377 3797 Fax: <u>+ 90 462 325 32 32</u> &-mail: cigdemhusem@ktu.edu.tr

Postal Address: Karadeniz Teknik Üniversitesi, Dış İlişkiler/Erasmus Ofisi, Rektörlük, 61080, Trabzon, Turkey





Thanks...

THE R. A.

A114100