Department of Geomatics Engineering / Department of Geomatics Engineering / Department of Geomatics Engineering

Course Code	Course Name	Teorical	Practice	Laboratory	Credits	ECTS
GE415	MATHEMATICAL FOUNDATION OF GEODESY	3.00	0.00	0.00	4.00	6.00

Course Detail

Course Language	:	English
Qualification Degree	:	Bachelor
Course Type	:	Optional
Preconditions	:	Not
Objectives of the Course	:	The course focuses on developing the ability to understand mathematical models for solving geodetic problems encountered in practice and to solve them by writing simple algorithms in Python programming language. This approach will contribute to the development of students' computational problem solving skills in general.
Course Contents	:	Python environment, geodetic forward and inverse problems, conformal projection, GNSS positioning algorithms, data visualization, parameter estimation in dynamical systems.
Recommended or Required Reading	:	1. Vermeer, M., Rasila, A. (2020). Map of the World: An Introduction to Mathematical Geodesy, CRC Press, Boca Raton. 2. Torge, W. (2012) Geodesy, 4th edition Walter de Gruyter , Berlin. 3. Bektaş, S. (2021) Jeodezi -I Küre Yüzeyinde Uygulamalar, Atlas Akademi, Ankara 4. Bektaş, S. (2021) Jeodezi -II Elipsoid Yüzeyinde Uygulamalar, Atlas Akademi, Ankara. 5. Kahveci, M., Tuşat, E., Doğanalp, S. (2021) Jeodezik Koordinat Sistemleri Teori-Uygulama, Nobel Akademik Yayıncılık, Ankara. 6. Ogundare, J.O. (2018). Understanding Least Squares Estimation and Geomatics Data Analysis, Wiley. 7. Hill, C. (2020). Learning Scientific Programming with Python, CUP, Cambridge.
Planned Learning Activities and Teaching Methods	:	Lecture based instruction, programming exercises, individual project study
Recommended Optional Programme Components	:	Students should have a basic knowledge of Python programming language in order to understand the topics given in the course and to perform the applications individually. Students having no Python knowledge are expected to watch the training videos recommended by the instructor at the beginning of the semester and improve their knowledge. The instructor should be contacted before the first week of the term
Instructors	:	Dr. Öğr. Üyesi Mehmet Güven Koçak
Instructor's Assistants	:	NA
Presentation Of Course	:	Lectures with interactive programming exercises
En Son Güncelleme Tarihi:	:	2/10/2024 8:50:24 PM

Course Outcomes

Upon the completion of this course a student :

1 Solve the spherical forward and inverse problems

2 Solve the ellipsoidal forward and inverse problems

3 Solve the conformal projection of the ellipsoid onto the plane

4 Perform datum and coordinate transformations

5 Process GNSS data using absolute and relative positioning models.

Preconditions

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Weekly Contents

	Teorical	Practice	Laboratory	Preparation Info	Teaching Methods	Course Learning Outcomes
1.Week	*Introduction: Python environment (Command line, Ipython, Spyder etc.)					
2.Week	*Necessary libraries: Numpy, Scipy					
3.Week	*Spherical forward and inverse problems					
4.Week		*Spherical forward and inverse problems				
5.Week	*Ellipsoidal geometry, forward and inverse problems					
6.Week		*Ellipsoidal geometry, forward and inverse problems				
7.Week	*Conform projection of the ellipsoid					
8.Week	*Mid-term exam					
9.Week		*Conform projection of the ellipsoid				
10.Week	*Datum and coordinate transformation					
11.Week		*Datum and coordinate transformation				
12.Week	*GNSS positioning models					
13.Week		*Applications with GNSS positioning models I				
14.Week		*Applications with GNSS positioning models II				

Assesment Methods %

1 Midterms : 40.000

3 Final : 60.000

ECTS Workload

Activities	Count	Time(Hour)	Sum of Workload
Derse Katılım / Attending lectures	13	3.00	39.00
Ders Öncesi Biresysel Çalışma / Individual study before lecture	13	3.00	39.00
Ders Sonrası Biresysel Çalışma / Individual study after lecture	13	4.00	52.00
Ara Sınav Hazırlık / Preparation for midterm	1	15.00	15.00
Vize / Midterms	1	0.00	0.00
Final Sınavı Hazırlık / Preparation for final	1	20.00	20.00
Final / Final	1	0.00	0.00
		Total :	165.00
		Sum of Workload / 30 (Hour) :	6
		ECTS :	6.00

Program And OutcomeRelation

	P.O. 1	P.O. 2	P.O. 3	P.O. 4	P.O. 5	P.O. 6	P.O. 7	P.O. 8	P.O. 9	P.O. 10	P.O. 11
L.O. 1	5	0	0	5	0	0	0	0	0	0	0
L.O. 2	5	0	0	5	0	0	0	0	0	0	0
L.O. 3	5	0	0	5	0	0	0	0	0	0	0
L.O. 4	5	0	0	5	0	0	0	0	0	0	0
L.O. 5	5	0	0	5	0	0	0	0	0	0	0