AGH UNIVERSITY OF SCIENCE AND TECHNOLOGY

Module name: Databases in environmental monitoring

Academic year: 2019/2020 Code: GIKS-2-310-WK-s ECTS credits: 3

Faculty of: Mining and Geoengineering

Field of study: Environmental Engineering Specialty: Industrial ventillation and air-conditioning

Study level: Second-cycle studies Form and type of study: Full-time studies

Lecture language: English Profile of education: Academic (A) Semester: 3

Course homepage: —

Responsible teacher: dr hab. inż, prof. AGH Niedoba Tomasz (tniedoba@agh.edu.pl)

Module summary

Multidimensional data analysis. Graphical way of data interpretation. Determination of water supplies. Water treatment processes. Evaluation of water quality. Designing of parameters of water reservoirs. Statistical approach to water waste treatment processes. Hazardous and radioactive pollutants evaluation. Modeling of environmental processes.

Description of learning outcomes for module

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Connections with FLO	Method of learning outcomes verification (form of completion)
Social competence: is able to			
M_K001	Student understands the meaning of influence of issues connected with environmental state in certain area on spatial development plans	IKS2A_K01, IKS2A_K03	Activity during classes, Test
M_K002	Student is aware about necessity of homogenous reporting about environmental condition in certain area.	IKS2A_K01, IKS2A_K03	Activity during classes, Test
Skills: he can			
M_U001	Student can organize appropriate course of data collecting in range of representativeness and sample size	IKS2A_U03, IKS2A_U02	Activity during classes, Test
M_U002	Student can properly select location and equipment of environmental monitoring station in certain area	IKS2A_U03, IKS2A_U02	Activity during classes, Test
M_U003	Student can properly show results of collected environmental state	IKS2A_U03, IKS2A_U02	Activity during classes, Test

M_U004	Student can perform statistical analysis of data originating from environmental monitoring system	IKS2A_U03, IKS2A_U02	Activity during classes, Test
Knowledge: he knows and understands			
M_W001	Student has knowledge about methods of evaluation and description of environmental data	IKS2A_W04, IKS2A_W05, IKS2A_W01	Activity during classes, Test
M_W002	Student has knowledge about monitoring nearby dump sites	IKS2A_W04, IKS2A_W05, IKS2A_W01	Activity during classes, Test
M_W003	Student has knowledge about measuring devices	IKS2A_W04, IKS2A_W05, IKS2A_W01	Activity during classes, Test
M_W004	Student has knowledge about evaluation of environmental pollution	IKS2A_W04, IKS2A_W05, IKS2A_W01	Activity during classes, Test

Number of hours for each form of classes

	Form of classes										
Suma	Lectures	Auditorium classes	Laboratory classes	Project classes	Conversation seminar	Seminar classes	Practical classes	Fieldwork classes	Workshops	Prace kontrolne i przejściowe	Lektorat
30	15	15	0	0	0	0	0	0	0	0	0

FLO matrix in relation to forms of classes

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Form of classes										
		Lectures	Auditorium classes	Laboratory classes	Project classes	Conversation seminar	Seminar classes	Practical classes	Fieldwork classes	Workshops	Prace kontrolne i przejściowe	Lektorat
Social competence: is able to												
M_K001	Student understands the meaning of influence of issues connected with environmental state in certain area on spatial development plans	+	+	-	-	-	-	-	-	-	-	-
M_K002	Student is aware about necessity of homogenous reporting about environmental condition in certain area.	+	+	-	-	-	-	-	-	-	-	-
Skills: he can												

M_U001	Student can organize appropriate course of data collecting in range of representativeness and sample size	-	+	-	-	-	-	-	-	-	-	-
M_U002	Student can properly select location and equipment of environmental monitoring station in certain area	-	+	-	-	-	-	-	-	-	-	-
M_U003	Student can properly show results of collected environmental state	-	+	-	-	-	-	-	-	-	-	-
M_U004	Student can perform statistical analysis of data originating from environmental monitoring system	-	+	-	-	-	-	-	-	-	-	-
Knowledge: he knows and understands												
M_W001	Student has knowledge about methods of evaluation and description of environmental data	+	+	-	-	-	-	-	-	-	-	-
M_W002	Student has knowledge about monitoring nearby dump sites	+	+	-	-	-	-	-	-	-	-	-
M_W003	Student has knowledge about measuring devices	+	+	-	-	-	-	-	-	-	-	-
M_W004	Student has knowledge about evaluation of environmental pollution	+	+	-	-	-	-	-	-	-	-	-

Student workload (ECTS credits balance)

Student activity form	Student workload
Udział w zajęciach dydaktycznych/praktyka	30 h
Preparation for classes	14 h
przygotowanie projektu, prezentacji, pracy pisemnej, sprawozdania	10 h
Realization of independently performed tasks	18 h
Examination or Final test	2 h
Contact hours	1 h
Summary student workload	75 h
Module ECTS credits	3 ECTS

Additional information

Module content

Lectures

1.Chosen parameters of evaluation of environmental pollution (pollution concentration

by certain substance, humidity, temperature, power and direction of wind etc.)
2.Measuring devices for environmental pollution.
3.Role of environmental monitoring automatic stations in industrial areas of Poland, location of monitoring station. Tasks of environmental monitoring.
4.Role and tasks of monitoring for dump sites.
5.Data collection, databases, issues connected with representativeness of sample, sample size.
6.Statistics in environmental data analysis.
7.Presentation of data, illustrative techniques of measurement results: circular graphs, spatial graphs, histograms.
8.Application of modern calculation techniques (decisive trees, neural networks, genetic algorithms) in investigation of environmental pollution state, determination of changes trends, methods of data mining in data selection.

Auditorium classes

1.Collection of data from measurements. Calculation of samples size.
2.Influence of location of environmental monitoring station on measurements of environmental pollution results.
3.Illustration of measurements by means of graphical techniques (circular graphs, histograms).
4.Application of modern calculation techniques to issues of environmental protection.

Teaching methods and techniques:

Lectures: Treści prezentowane na wykładzie są przekazywane w formie prezentacji multimedialnej w połączeniu z klasycznym wykładem tablicowym wzbogaconymi o pokazy odnoszące się do prezentowanych zagadnień.
Auditorium classes: Podczas zajęć audytoryjnych studenci na tablicy rozwiązują zadane wcześniej problemy. Prowadzący na bieżąco dokonuje stosowanych wyjaśnień i moderuje dyskusję z grupą nad danym problemem.

Warunki i sposób zaliczenia poszczególnych form zajęć, w tym zasady zaliczeń poprawkowych, a także warunki dopuszczenia do egzaminu:

Final grade is given on the basis of final test.

Zasady udziału w poszczególnych zajęciach, ze wskazaniem, czy obecność studenta na zajęciach jest obowiązkowa:

Lectures:
– Attendance is mandatory: No
– Participation rules in classes: Studenci uczestniczą w zajęciach poznając kolejne treści nauczania zgodnie z syllabusem przedmiotu. Studenci winni na bieżąco zadawać pytania i wyjaśniać wątpliwości. Rejestracja audiowizualna wykładu wymaga zgody prowadzącego.
Auditorium classes:
– Attendance is mandatory: Yes
– Participation rules in classes: Studenci przystępując do ćwiczeń są zobowiązani do przygotowania się w zakresie wskazanym każdorazowo przez prowadzącego (np. w formie zestawów zadań). Ocena pracy studenta może bazować na wypowiedziach ustnych lub pisemnych w formie kolokwium, co zgodnie z regulaminem studiów AGH przekłada się na ocenę końcową z tej formy zajęć.

Method of calculating the final grade

The grade from final test is automatically final mark. It can be changed on the basis of frequency of being present during courses and activity of the student.

Sposób i tryb wyrównywania zaległości powstałych wskutek nieobecności studenta na zajęciach:

Individual work by the remarks given by tutor.

Prerequisites and additional requirements

Evaluation of influence on environment (s.1), Computer systems in environmental monitoring (s. 1), Creation and modernization of dump sites (s. 1), Quality systems in monitoring (s. 2), Statistics (s. 2)

Recommended literature and teaching resources

1. Breiman L., Friedman J., Olshen R., Stone C.: Classification and Regression Trees, Wadsworth, Belmont, CA, 1984.
2. Goldberg D.E.: Algorytmy genetyczne i ich zastosowania, WN-T, 2003.
3. Juda J., Chróściel S.: Ochrona powietrza atmosferycznego: zagadnienie wybrane, WN-T, 1980.
4. Kamiński D.: Państwowy monitoring środowiska, Branżowy Portal Internetowy, Ochrona, 2008.
5. Koronacki J., Mielniczuk J.: Statystyka, WN-T, 2001.
6. Kosiński R.A.: Sztuczne sieci neuronowe, dynamika nieliniowa i chaos, WN-T, 2007.
7. Kucowski J., Laudyn D., Przekwas M.: Energetyka a ochrona środowiska, WN-T, 1997.
8. Krupa K.: Modelowanie, symulacja i prognozowanie, WN-T, 2008.
9. Lin T.: Data mining: Foundations and practice, Springer Verlag, 2008.
10. Michalewicz Z.: Algorytmy genetyczne+struktury danych, WN-T, 2003.
11. Rabajczyk A.: Rodzaje zanieczyszczeń powietrza i ich źródła, EKOINFO.PL, serwis informacyjny ochrony środowiska, 2001-2008.

Scientific publications of module course instructors related to the topic of the module

1.Soliński B., Niedoba T.: Aproksymacja rozkładu prędkości wiatru za pomocą nieparametrycznych metod statystycznych, w Konwersja odnawialnych źródeł energii pod red. nauk. Aleksandra Lisowskiego, Wydawnictwo: Wieś Jutra, 2009.
2.Tumidajski T., Foszcz D., Niedoba T., Siewior J.: Modele stochastyczne zanieczyszczeń powietrza w aglomeracjach przemysłowych, Rocznik Ochrona Środowiska, vol. 11(1), pp. 543-554, 2009.
3.Foszcz D., Niedoba T., Siewior J., Tumidajski T.: Stochastic models of air pollutants spreading as the method of emission amount management allowing elimination of high pollution concentrations in ecosystems, w Environmental management accounting and cleaner production, pp. 239-244, Graz, Austria, 2006.
4.Tumidajski T., Foszcz D., Niedoba T., Siewior J.: Stochastic models of air pollution in industrial agglomerations, w Proceedings of Ochrana ovzdušia = Air protection 2008, pp. 128-132, 2008.
5.Tumidajski T., Siewior J., Foszcz D., Niedoba T.: Ocena wpływu stężeń zanieczyszczeń powietrza w GOP-ie na jakość powietrza w rejonie Opola i Kędzierzyna-Koźla, Rocznik Ochrona Środowiska, vol. 16, pp. 519–533, 2014.
6.Siewior J., Tumidajski T., Foszcz D., Niedoba T.: Prognozowanie stężeń zanieczyszczeń powietrza w GOP-ie modelami statystycznymi, Rocznik Ochrona Środowiska, vol. 13(2), pp. 1261-1274, 2011.

Additional information

The presence is obligatory – one absence permitted
Two dates for final test (1 main and 1 additional)
Eventually, one class can be done with another group