

DEMOCRITUS UNIVERSITY OF THRACE
SCHOOL OF ENGINEERING
CIVIL ENGINEERING DEPARTMENT



ACADEMIC GUIDE
POSTGRADUATE PROGRAM
HYDRAULIC ENGINEERING AND
ENVIRONMENT
2022 - 2023

XANTHI - 2022

DEMOCRITUS UNIVERSITY OF THRACE
MASTER'S DEGREE PROGRAM ACADEMIC GUIDE
HYDRAULIC ENGINEERING AND ENVIRONMENT
ACADEMIC YEAR 2022 - 2023

EDITOR:
Angelidis Panagiotis, Professor

Contents

Thrace.....	2
Xanthi	4
Democritus University of Thrace.....	7
The Department of Civil Engineering.....	18
Part Structure	20
Department Staff	21
Hydraulic Engineering and Environment.....	20
Academic Calendar 2022-2023.....	23
Curriculum.....	27
Course Description	28
Learning Outcomes..	41



THE THRACE



Greek Thrace is a small part of the geographical area known in history as the "Greater Thrace". Incorporated into Greece in 1920, it is located on the northeastern mainland and adjoins eastward with Turkey and northward with Bulgaria, with which it is connected by road and rail.

The Greek Thrace constitutes, along with the An. Macedonia, special administrative region of the Greek state with the capital of Komotini. It consists of three prefectures (Xanthi, Rodopi and Evros) with the capitals of Xanthi, Komotini and Alexandroupolis, respectively. The prefecture of Evros also belongs to Samothrace, one of the most beautiful islands of the Aegean Sea.

In addition to agriculture and livestock farming, which were the traditional branches of the economy in the region, the development of the industry has been seen in the last few years.

The Commission's proposals are in line. Thrace, due to its key geographical location, has developed into a "gateway" of Europe to Turkey and the East, as well as an important transportation hub to and from the central Balkan region. These developments, combined with the development of the University in four cities of Thrace (Xanthi, Komotini, Alexandroupolis, Orestiada), result in the gradual development of the area and the rise of the living and spiritual level of its inhabitants.

In Greek Thrace are important archeological sites such as Abdera (home of Democritus from which the name of the University was derived), Maroneia, Mesembria, Samothrace etc. Also in Thrace belong to extremely important wetlands, such as the delta rivers Nestos and Evros and the lagoon of Vistonida, and one of the most important national parks in Greece where some of the most rare species of birds of prey in Europe, the forest of Dadia, live.

XANTHI

Built amphitheatrically at the foot of the Rhodope mountain range, Xanthi is located in Thrace (Northern Greece), the crossroads of the Black Sea and the Aegean, Europe and Asia. The Kossyfos River divides the city into the western part, where the old and modern part of the city are located, and on the eastern side, the

“Samakov district” which can be proud of a rich natural environment. Both parties still maintain their traditional atmosphere, charming the visitors with their courtesy and their greatness. The narrow cobbled streets of the old town are decorated with gorgeous mansions, whose architecture is a wonderful blend of local and Ottoman architecture, and of Greek neoclassical architecture. Along with the Byzantine churches and picturesque squares, the old town of Xanthi could be said to be an open museum, the glory of which remains intact over time. The modern part of the city is located in a beautiful square with the central clock and the renovated tobacco warehouses, such as the famous “P”, on Kapergon Street, which was named after the shape of the buildings of 1890.

her, which happens every Saturday.

Take a deeper taste of the rich history of the region through your visit to the Museum of Folk Art, Museum of Natural History, Municipal Art Gallery and Abdera archeological site. Numerous cultural events organized throughout the year offer one more important reason to visit Xanthi. Festivals Old

In September, where all events take place in the narrow cobblestone streets of the old town of Xanthi, the Youth Festival and the Music Festival of the Nestos River in summer, are especially popular among young people.



Text by Greek National Tourism Organization

www.visitgreece.gr

XANTHI COASTLINE

All over the southern part of N. Xanthi stretches beautiful beaches, open to the Thracian Sea, which are delimited west by the Nestos Delta and east by the lagoons of the complex of Vistonida: Beaches and spaces well organized and equipped are those of Erasmio, Mangana, Myrdatos, Abdera and Mandra, access from the city is fast and the road network is sufficient. These beaches stand out for their cleanliness, the shallow waters, vast beaches and picturesque coves that attract holidaymakers but also artisanal fishermen. These areas offer a sublime beauty in the winter months as well as many opportunities for bird watching.

OLD CITY CELEBRATIONS

The second festive institution in Xanthi is the Old Town celebrations, which have been uninterrupted since 1991, take place with the advent of

Autumn. Most of these events take place in the traditional preserved settlement of Xanthi, the so-called "Old Town", in the alleys of which the hangars of the cultural and carnival clubs are erected to offer food and drink. The club's haunts are revealed, while festivals similar to those of Carnival are held in the same place.

CARNIVAL OF XANTHI

The longest-lived institution is that of the Blonde Carnival - Thracian Folklore Holidays started in 1966. Born in an era of urbanization and industrialization - a time critical to economic issues and identity issues - it has erased a fifty-year course, passed various phases of development and mutation reaching our days. The Carnival Blonde has to show a series of events around music, dance and theater, exhibitions with visual or other content, lectures, book presentations and film screenings. During these two weeks of events in the city of Xanthi very important position occupies another form of social performance, the feast, which is encountered in many different places and forms. The institution closes with the carnival parade and the custom of burning the Tzaros effigy.



THE YOUTH CELEBRATIONS

The third festive institution, the Youth Celebrations, took place in late Spring, started in the same year as the Old Town Celebrations and, as the title reveals, it is focused on the student youth of the city. These celebrations enable students to become protagonists both on the stage and the audience. Thus the inhabitants of the city know the events of the urban area either through a process of creation - production or through a participation procedure - consumption.

HADJIDAKIS FESTIVAL

This is the Hadjidakis Festival "Xanthi: Cities of Musical School Dreams" which was inaugurated in 2014, in honor of the great Greek Composer who was born and raised in Xanthi. The festival offers the opportunity to Music Schools from all over Greece to be presented at the Municipal Amphitheater of the city, but also in selected squares in various parts of the city.



THE DEMOCRITUS UNIVERSITY OF THRACE

HISTORICAL BACKGROUND



ΔΗΜΟΚΡΙΤΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΡΑΚΗΣ
DEMOCRITUS UNIVERSITY OF THRACE

The Democritus University of Thrace was founded in July 1973 by the Decree Law No. 87 of 27 July 1973, and began its operation in the academic year 1974-1975. As mentioned, it was named "Democritus" in honor of the ancient Greek philosopher Democritus, who hailed from the city of Abdera in Thrace. The administration of IFRIC it is based in Komotini, which is also the capital of the Administrative Region of Eastern Macedonia and Thrace. The IFRS it plays an important role in the strengthening of the national and cultural identity of the region of Thrace and contributes to the high level of higher education studies in Greece. With the quality of teaching and the level of his research, he has secured a place among the best Greek S.A.I. As a Higher Educational Institution, IFRIC is a Public Law Corporation with full self-government. It is supervised and subsidized by the State through the Ministry of Education and Religious Affairs. The Board of Directors currently operates eight Faculties which include twenty Departments, in four cities of Thrace: five (5) in Xanthi, nine (9) in Komotini, four (4) in Alexandroupolis and two (2) in Orestiada. In IFRS More specifically, the following Departments are currently operating per city (in brackets the starting year) the function of each Department):

XANTHI

1. Department of Civil Engineering (1974)
2. Department of Electrical Engineering and Computer Engineering (1975)
3. Department of Environmental Engineering (1995)
4. Department of Architecture Engineering (1999)
5. Department of Production and Management Engineering (2000)

KOMOTINI

1. Department of Law (1974)
2. Department of Physical Education & Sport Science (1984)
3. Department of History and Ethnology (1991)
4. Department of Social Policy (1994)
5. Department of Greek Literature (1995)
6. Department of Social Work (1996)
7. Department of Economic Sciences (1999)
8. Department of Language, Literature and Culture of Black Countries (2000)
9. Department of Political Science (2009)

ALEXANDROUPOLI

1. Department of Medicine (1985)
2. Pedagogical Department of Municipal Education (1986)
3. Department of Education Sciences at Preschool Age (1987)
4. Department of Molecular Biology and Genetics (2000)

ORESTIADA

1. Department of Forestry and Environment and Natural Resources (1999)
2. Section for Rural Development (1999)

ADMINISTRATION OF D.U.Th.

The administration of the Board of Directors shall be exercised by the Council of the Foundation, the Rector and the Senate. The Senate consists of the Rector, the Deans of the Faculties, the Heads of the Departments. The manner of determining the representation of the Presidents shall be determined by a decision of the Rector. Also a representative of the undergraduate students, a representative of the postgraduate students and a representative of the doctoral candidates, where they exist, are elected for an annual term without the possibility of re-election. It shall also include a representative of each category of staff, with a two-year term, without possibility of re-election, elected by a single ballot by universal suffrage of the members of the relevant category of staff and participating, with the right to vote, when matters relating to matters concerning the relevant category of staff are discussed. The exact composition and the number of members of the Senate with the right to vote, as well as the conditions and any matter relating to the implementation of the above, shall be laid down in the Agency and the Rules of Procedure of the Board respectively. The Senate meetings are attended without the right to vote by the rector's deputies and the Secretary of the Foundation. The Rector and Vice-Rectors in the academic year 2022-2023 are the following:

Rector : F. Maris

Professor of the Department of Civil Engineering

Vice Chancellor of Finance, Planning and Development: C. Chalioris

Professor of Department of Civil Engineering

Vice-Chancellor of Academic Affairs and Student Care: M. Grigoriou

Professor of Department of Molecular Biology and Genetics

Vice-Chancellor of Research and Lifelong Learning:
G. Broufas

Professor of Department for Rural Development

Vice Chancellor of Administrative Affairs:

V. Gourgoulis

Professor of Physical Education and Sports Science



On the page Democritus of the University of Thrace:

<http://www.duth.gr>

ADMINISTRATION OF THE SCHOOL OF ENGINEERING

The governing bodies of the Polytechnic School are the General Assembly, the Quaestura and the Dean. The General Assembly consists of the General Assemblies of the Departments while the Dean, the Presidents of the Faculty of the and a representative of the students of each Department participate in the College.

The Quaestor is elected for three years by an electoral body composed of the total of electoral bodies that elect the Presidents of the Departments which belong to the School.

For the academic year 2022-2023 the administration of the Polytechnic School is:

Dean :

B. Papadopoulos

Professor of Department of Civil Engineering

Deputy Secretary:

T. Spanidou

This page is a Technical School Jewel:

<http://www.eng.duth.gr>

LIBRARY OF THE SCHOOL OF ENGINEERING

The Library has 75,000 volumes and 2000 titles of magazines, with the current subscriptions being mostly electronic. The loan is based on the Senate Rules of Operation of the Central Library approved by the Senate.

H library is accessible from the internet.

On its websites interested parties can search the books of both the Polytechnic School and all other Faculties and Departments of the University as well as all the academic libraries of the country that have corresponding network services.

The library over the HealLink network can be accessed on 5,000 magazine titles. Instructions on how to search the information are provided by the library staff. Also students can be informed about and from the respective pages of the library on the Internet.

Library Hours:

Monday - Friday: 07.00 - 14.30

Hours of Reading Room: Monday -

Sunday: 07.00 - 24.00

Library page:

<http://www.lib.duth.gr>

STUDENT CARE

Responsible: E. Kravaritou

Feeding

To the students of the Polytechnic School free feeding under conditions. Information on the categories of students

who are entitled to free food and the required supporting documents and the dates of submission are provided by the office Student Care Xanthi.

Housing

The Student House (FC) has a large number of rooms that are distributed and are located in the same area of the University Campus. It also has a restaurant with the capacity to serve 1,000 people.

Criteria for admission to VAT is the financial situation in proportion to the number of members of the student's family and others appointed by the Senate of the IPOC. the rules of operation of VAT.

Applications with the relevant supporting documents are submitted for the new-entrants within the period of time that the enrollments in the respective Schools last. No application shall be admissible beyond this period.



Health Care

The students of the University are provided with medical, hospital and pharmaceutical care (N.E.S. 327/1983 (FEK 117/7-9-83(a))). Medical care is provided by the city doctors who are affiliated with the State.

Health, medical and hospital care are entitled to undergraduate and postgraduate students of S.A., nationals and foreigners. After the period, provided for as a minimum duration of undergraduate studies of a course increased by two (2) years, the benefits provided for students, such as Health and Hospital Care, Performance Grants and Scholarships for Aid Loans, Free Food, Accommodation and Supply of Textbooks or Other Aids, Mobility Facilitation etc., are not granted. (Art. 9 par. Point 10 of Annex I. 2083/92).

ADVISORY AND ACCESSIBILITY STRUCTURE (CONT.)

The Advisory and Accessibility Structure (AAS) of the Democritus University of Thrace was established with the number number 40/51/12.12.2017 Decision of the Senate. It started operating in 2018 and during the initial phase of its operation it is funded by the NSRF 2014-2020, through the Act "Support of Social Care Interventions of Students NT".

Purpose of the AAS it is the promotion of constructive learning, academic success and the socialization of the students of the ICP, with peculiarities and disabilities.

The aim of the AAS is:

- Equal access to educational activities of students with special needs and disabilities, through the adaptation of the educational environment, the utilization of supporting IT technologies and the provision of services facilitating access to spaces and knowledge.
- Personal development and improvement of the social life of students with peculiarities and disabilities, inside and outside the education spaces.

In particular, actions are being developed in the AAS to address problems related to the following issues:

- Studies: learning difficulties, difficulties in studying and understanding, difficulties in decision-making, inability to concentrate, testing anxiety, incompatibilities of educational spaces, means and materials due to disability.



- Academic life: difficulties in adjusting to the educational environment, difficulties in organizing and managing time, negative attitude towards the subject studies.
- Social life: difficulties in friendly and family relationships, isolation, low self-esteem, difficulties in acceptance and integration in social environment.
- Other problems: psychosomatic disorders, emotional problems, addictions.

The Central Bureau of the AAS it is based in Komotini and Branches in the cities of Xanthi, Alexandroupolis and Orestiada.

It is scientifically supervised by members of the Board. on a related subject of its work and consists of the Counseling and Psychosocial Support and the Accessibility Department.

Communication:

Call center: 25310-39050, -39163 E-mail: dosyp@duth.gr

Website of the Board:

<https://dosyp.duth.gr>



Department of Counseling and Psychosocial Support

The Department staffed of Psychiatrist, psychologists and social workers.

Services

- Individual counseling for students who have difficulties with studies (learning difficulties, difficulties in studying and understanding, inability to concentrate, stress tests) or with other issues of a psychological and social nature.
- Periodic assessment of the psychosocial needs of students.
- Group counseling.
- Networking of students with health services and social services of the region.
- In case of need to address.

Workshops / Seminars

Organization of seminars and workshops with an experiential and interactive character aimed at the empowerment and personal development of students

Volunteerism

Organize a network of volunteers with the aim of creating socialization and voluntary activities in the wider community.

Accessibility Pane

The Department is staffed by Electrical Engineers and Computer Engineers.

Please contact your doctor or pharmacist

- Adapting the education environment by utilizing digital accessibility tools;
- Designing accessible library and internet workstations.
- Create a digital environment for counseling, psychosocial support and accessibility actions.
- Convert educational materials and projects to an accessible format.
- Personalization of assistive technology by applicant student and training in the use of assistive technologies and software.

Accessibility Services to Buildings and Infrastructure of AAS

- Study on the accessibility of buildings and other infrastructure.
- Evaluate amendments to improve accessibility of IFRS buildings and provide knowhow to other entities.

Teaching Assistance Software

Offered free software and assistive technology applications.

Volunteerism

The Accessibility Department collaborates with volunteers on actions to convert educational materials into accessible format.

STUDENT PASS

Students submit their application for the pass electronically through the website:

<https://submit-paso.minedu.gov.gr> using Article 10 personal the codes electronic access on the portal of the School of Engineering: <https://unistudent.duth.gr/>.

Thereafter, and after the application is approved by the relevant Secretariat, each student may receive his Bulletin from the specific point of delivery chosen at the time of the application. The delivery points have been identified as certain commercial stores as they have been identified by the project contractor.

The final cost of receiving the Bulletin, after the relevant competition, is 2.56 euro (incl. VAT).

The new pass is a credit card type, meets all the modern specifications, with built-in photo of the beneficiary, a special security hologram and its elements in Latin characters (for use on the outside).

The beneficiaries of the new special ticket are:

(1) Students of the first course of study provided that they have not exceeded the $n+2$ years of study (where n is the duration provided for in the indicative program of studies).

(2) Students of the second course of study for as many years as they study, in accordance with the indicative program.

(3) Students of the third course, for 4 years from the date of their enrollment.

Please note that students who have exceeded the 29th year are not entitled to a pass (29) year of their age, on the day of submission of the application or have been admitted with qualifying examinations. Furthermore, the discontinuation of student status for any reason automatically entails termination of the right to hold the pass, which in this case is returned to the secretariat of the Department concerned.

Each Secretariat is connected to the Central Information System through a dedicated online application from which to monitor students' applications.

First-year students, until 30 September, can make use of public transport, with the corresponding discounts, by showing the certificate of registration in the Department, issued by the Secretariats and their police identity, until they receive their official Bulletin.



TRANSPORT

The students are served (for their move to the Campus where the rooms of the Student Dorm are located, the Student Club restaurant and the new buildings of the Department), by means of transport chosen by the University, as well as by emergency routes University - Student Club during lunch hours starting from the bridge of the Samakov district.

CULTURAL EVENTS

Students have at their disposal a number of Cultural Events of the Municipality of Xanthi, as mentioned above. Also the two student clubs "Bridge" and "Inmates of the Student Center of Xanthi" organize cultural events of photography, cinema etc.

MILITARY CONSCRIPTION

Students who have not fulfilled their military obligations are entitled to deferment of conscription for the completion of their studies.

The postponement shall be granted for a period equal to that resulting from the accounting aggregation of the year of granting the postponement and the study years plus two.

Further information can be obtained from the local recruitment offices.



COMPUTE CENTER - NETWORK MANAGEMENT CENTER

Director: N. Kasapidis

Personal: N. Grigoriadis

I. Plevridis

P. Hatzopoulos

The Computational Center of IFRS it began operating in 1976 with the installation of the first UNIVAC 90/30 computer system and was basically used by the Polytechnic School. Today the Computational Center - Network Management Center of MESS is an institutionalized body, operating by organization, approved by Senate decision, and serves the entire University that is spread throughout Thrace, with DUTHnet, it has a plethora of computers, and all modern applications such as email, high-speed Internet access and more.

By decision of the Senate (21/01/18, September 2014) from September 2014 a new Commission with the title of 'Communications and Networks Committee' of IFRIC which replaces the previous Computational Center and Network Management Committees, and Telecommunications Committee that are being abolished.

Y.K. Website - N.A. :

<http://www.noc.duth.gr>



OFFICE FOR INTERCONNECTION BETWEEN STUDIES AND CAREER

Head: D. Tsitsis

The Liaison Office of the Democritus University of Thrace was established as part of the Operational Program of Education and Initial Vocational Training (EPAE). Through this newly established institution, the Liaison Office is an information center for students and graduates of our University, aspiring to become a link between the University and the Production Community, so that it can help its students and graduates to reach the professional rehabilitation phase smoothly. The special feature of the office lies in the fact that due to the diaspora of the University in more cities, there are currently three different branches in the cities of Xanthi, Komotini and Alexandroupolis.

Study Liaison Office website and

In the course of a career:

<https://dasta.duth.gr>

The absence of staff/students from room/lab photographs is due to privacy reasons

ERASMUS

Coordinator for the Civil Engineering
 Department: I. Kagalu, Professor.

The Erasmus+ program is the main education and training program in the EU, focusing on student and staff mobility and cooperation between higher education institutions. Erasmus+ supports the creation and establishment of the European Charter of Higher Education, thus increasing innovation, growth and employment.

Through the program, the students are offered the following possibilities:

1) Student exchanges for course monitoring at European universities with mutual recognition of educational programs by sending and hosting universities. This is done with the implementation of the provisions of the European Credit Transfer and Accumulation System (European Credit Transfer and Accumulation System ECTS) and a similar system at the host university. Under the Bilateral Agreements that the University has concluded with foreign institutions, the students of the Civil Engineering Department of the IPOA. may go to study at one of these Institutions for a period which may not be less than 3 months or more than one year. The conditions for participation are detailed at the website, <http://erasmus.duth.gr/node/4>.

2) Practical traineeships lasting 2 to 4 months, in bodies such as Business, Non-Governmental Organizations, Research Centers, Educational Institutions, diplomatic missions etc from students from all courses (pre-graduate - postgraduate - candidates)

and recent graduates of the Board of Directors. Q. I. in European countries (<http://erasmus.duth.gr/node/16>). In both cases, the Erasmus+ program provides participants with a scholarship to cover the additional costs they will face, exemption from foreign tuition fees and recognition of the period of studies they are undergoing at the foreign University or organization. The International Relations Office of the Board of Directors has the general and financial management of the Erasmus+ Program for the outgoing and incoming mobility of students for studies and placements, teachers for teaching and staff for training.

For the Department of Civil Engineering, Academic Coordination is the Erasmus Committee of the Department, which is composed of 3 members of the faculty. The Committee shall define in advance the procedure for the selection of students to be included in mobility, publish calls for expression of interest and select students on the basis of criteria. The Erasmus+ Committee of the Department has drawn up a roadmap to assist outgoing students on the actions before and after their movement with a view to making the most useful use of the time of study at the host institution or organization and to recognizing their progress.

For studies abroad the Department of Civil Engineering D.U.Th. has concluded the following active Cooperation Agreements with universities (by country):

Germany: [Ruhr-Universität Bochum](#)

[Technische Universität Dortmund](#)

Spain: [Universidad de Granada](#)

Italy: [Università degli Studi della Tuscia](#)

[Politecnico di Bari](#)

Cyprus: [Cyprus University of Technology](#)

Hungary: [Buda pest i Műs zaki és Gazdaságtudományi Egyetem](#)

Romania: [Technical University of Cluj-Napoca](#)

Turkey: [Kırklareli Üniversitesi](#)

For the traineeship, the Commission is recommended to

Students will be able to contact the host institutions where the practical training will take place and to obtain a Letter of Acceptance and Working Program, in which the detailed program of the traineeship will be described in detail, as well as the tasks of the trainee which should be relevant to the subject of the study. The letter will be submitted together with the other necessary supporting documents in the application file. The Department of Civil Engineering supports and encourages mobility through the Erasmus+ because it considers that:

- It contributes to the interaction and familiarization of students of the department with the culture and culture of other Countries.
- It offers outgoing students the opportunity to familiarize themselves with educational systems in other Countries and the working environment in them.
- It offers the further learning of foreign languages and technical terminology.
- Creates a framework for new academic and professional possibilities
- It contributes to the further academic constitution of students.

More information can be found in the relevant regulation posted on the website of the Department ([link](#)).

IAESTE

Head: T. Papadopoulos,
Op. Professor of Electrical
Engineering and Computer
Engineering.

I.A.E.S.T.E. (International Association for the Exchange of Students for Technical Experience) is an international organization, for the purpose of exchanging students of applied disciplines (Technical University, Economics Universities, etc.) between the countries - members of the organization, for practical exercise related to the subject of their studies, outside the limits of their country.

In our country he is represented by the I.A.E.S.T.E National Council. Greece and in cities with Universities involved by the Local Committees. The Technical School of Xanthi has been established and operates the Local I.A.E.S.T.E Committee. Xanthi. The aim of this Committee is to find each year a number of reception places for foreign students in Greek companies. These posts ensure the possibility of sending students of the Xanthi Polytechnic School to countries abroad for internships, which is considered so essential for engineering studies, that many of the departments of the Polytechnic School of Xanthi have included it in their curriculum.

Web page IAESTE Xanthi:
<https://iaeste.duth.gr>

THE DEPARTMENT OF CIVIL ENGINEERING



ADMINISTRATION OF THE DEPARTMENT

Former Presidents of the Chamber

The governing bodies of the Department are the President, the General Assembly of the Department, the Directors of the Sectors and the General Assemblies of the Sectors of the Department. The powers of these bodies are defined by the legislation in force.

The General Assembly of the Department consists of the Professors of the Department, one (1) representative per category of the members of EPE, EPE, ETEP, ETEP, one (1) representative of the undergraduate and postgraduate students of the Department.

The President of the Department is elected for a two-year term by a body of electors comprising the Professors of the Department.

The directors of the Sectors are elected every year.

Iliadis L.	2020-2022
Elenas A.	2018 - 2020
Elenas A.	2016 - 2018
Michalopoulou M.	2016 - 2016
Karayiannis Chr.	2014 - 2016
Karayiannis Chr.	2012 - 2014
Chrysanthou V.	2010 - 2012
Karayiannis Chr.	2008 - 2010
Karabinis A.	2006 - 2008
Karabinis A.	2004 - 2006
Diamantis J.	2002 - 2004
Diamantis J.	2000 - 2002
Matsoukis P.F.	1995 - 2000
Xalioulias A.	1993-1995
Sideris K.	1991-1993
Sideris K.	1989-1991
Gdoutos E.	1987 - 1989
Loukakis P.	1985 - 1987
Koutitas X.	1984-1985
Stefanis B.	1983 - 1984
Kotsovinos N.	1982-1983

Chairman:

L. Iliadis, Professor

Deputy Chairman:

C. Akratos, Asc. Professor

Head of Secretariat: P.

Tsobanaki



On the Civil Engineering Department page:

<http://www.civil.duth.gr>

STRUCTURE OF THE CIVIL ENGINEERING DEPARTMENT

Today the Department of Civil Engineering consists of the following Fields:

- Sector of Construction Science
- Sector of Transport and Communications
- Sector Hydraulic Works
- Sector of Geotechnical Engineering
- Sector of Mathematics, Programming and General Lessons

The Domains are subdivided into Laboratories as follows:

- ◆ [Sector of Construction Science](#)
 - Laboratory of Static and Dynamics of Construction
 - Laboratory of Reinforced Concrete and Earthquake Structures
 - Laboratory of Metal Construction
 - Laboratory of Technical Engineering
 - Laboratory of Building Design
 - Laboratory of Construction Materials

- ◆ [Sector of Transport Projects and Communication](#)
 - Laboratory of Road and Road Safety
 - Laboratory of Transport Technique and Design-Organization of the Site

- [Sector of Hydraulics works](#)
 - Laboratory of Hydraulic Engineering and Environment
 - Laboratory of Hydrology and Hydraulics Works
 - Laboratory of Coastal and Port Works

- ◆ [Sector of Geotechnical Engineering](#)
 - ◆ Laboratory of Soil Engineering and Foundations
 - ◆ Laboratory of Technical Geology and Groundwater Research

- [Sector of Mathematics, Programming and General Lessons](#)
 - Laboratory of Organization and Planning
 - Laboratory of Mathematics and Informatics in Science of Civil Engineering
 - Laboratory of Geodesy

HYDRAULIC ENGINEERING AND ENVIRONMENT

MODULE

The main object of the Master program is: the high-level specialization in the latest developments in the wider field of Hydraulic Engineering and Environment.

The aim of the program is: (a) The high-level graduate education, research and specialization for the production of new knowledge in modern areas of Hydraulic Engineering and the Environment. (b) The promotion of scientific research carried out internationally in this field of Civil Engineering. (c) The establishment of scientists - researchers who will have the infrastructure and the necessary resources for the production of independent and original scientific research and for the supply of specialized work. (d) More effective response to the needs of the country in civil engineering engineering in relation to hydraulic engineering and the environment, with the production of specialized graduates with techniques and skills related to the design and implementation of hydraulic, hydroenergy, port and coastal projects and water resource management projects.

CATEGORIES OF GRADUATES

Graduates of all University Departments and Faculties and Technical Universities of a similar subject can be admitted to the Master Program.

DURATION OF STUDY

The duration for the award of the Master degree is set at two (2) semesters and in the summer period (intensive program).

LESSON PLAN

The total number of credit units (ECTS) required to acquire the Master Degree is 75.

The award of the Master Degree requires the successful examination in the prescribed courses and the successful evaluation of Diplomatic Work.

The teaching of each course lasts one academic semester and corresponds to six (6) ECTS. Lively teaching methods, systems and web applications of synchronized e-learning, intensive courses and any other method deemed appropriate may be used for the smooth functioning of the education process. 100% of courses may be conducted remotely, as provided by n. 4485/2017. The distance learning of lectures is provided to facilitate postgraduate students, who either do not have the financial opportunity to be in Xanthi during the whole period of study, or work. The distance learning courses are possible as the Department of Civil Engineering has three certified rooms for teleconferencing - tele-training as well as licenses for the use of appropriate software (MS Teams, Big Blue Button (synergia)).

Attendance at courses is compulsory. Each graduate student must attend and successfully examine in ten (10) courses in total. Postgraduate students are required to prepare a Postgraduate Thesis, which corresponds to fifteen (15) ECTS.

LANGUAGE OF TEACHING AND OF THE PREPARATION OF DIPLOMATIC WORK

The courses are taught in Greek, but a total or partial structure of studies in English is possible when the number of foreign-language postgraduate students per course exceeds five (5). The language of the writing of the Diploma Thesis is Greek and in special cases English.

STAFF

For the implementation of the Master Program 15 Faculty members are participating in the courses teaching. Six of them are active Faculty members of the Hydraulic Works Sector, 7 others are active members of the Civil Engineering Department and Emeritus Professors, 1 Faculty member is from the Department of Forestry and Management of Environment and Natural Resources of the D.U.th. and 1 is external partner. In detail, the Professors are:

**DEPARTMENT OF FORESTRY AND
MANAGEMENT ENVIRONMENT AND
NATURAL RESOURCES**

1. AS. PROFESSOR PAPAIOANNOU C.

EXTERNAL PARTNERS

1. Dr. KAZAKIS N.

HYDRAULIC ENGINEERING SECTOR**MEMBERS OF THE BOARD**

1. PROFESSOR KAGALOU I.
2. PROFESSOR ANGELIDIS P.
3. PROFESSOR MARIS F.
4. ASSOCIATE PROFESSOR AKRATOS C.
5. ASSOCIATE PROFESSOR SPILIOTIS M.
6. ASSISTANT PROFESSOR SAMARAS A.

CIVIL ENGINEERING

1. PROFESSOR ILIADIS L.
2. PROF. PAPADOPOULOS B.
3. PROF. PLIAKAS F.-K.
4. Dr. PAPALEONIDAS A.
5. EDP KATOPODES E.
6. EMERITUS PROFESSOR CHRYSANTHOY V.
7. EMERITUS PROFESSOR DIAMANDIS J.

DIPLOMA SUPPLEMENT

The Master Programm “Hydraulic Engineering and Environment” from the academic year 2018-2019 grants to the graduate students/-students of the Diploma Supplement in Greek and English language.

The Diploma Supplement follows the model developed by the European Commission, the Council of Europe and UNESCO/CEPES. The aim of the Annex is to provide sufficient independent data to improve the international "transparency" and fair academic and professional recognition of qualifications (diplomas, degrees, certificates, etc.).

It was designed to give a description of the nature, level, background, content and status of the studies, which were successfully completed by the person named in the original of the title to which this annex is attached.

PLAGIARISM

The students and students of the Department assume the responsibility not to fall for the offense of plagiarism. If plagiarism is established, disciplinary proceedings shall be instituted as provided for in the Foundation Regulation.

The work is also subject to electronic control plagiarism by the teacher/teacher.

Any work submitted, undergraduate or postgraduate or doctoral, is accompanied by the following affidavit, which is attached to the final text before the contents page of the work:

“I confirm that I am the author of this work and that I have stated or referred to it, explicitly and specifically, all sources from which I have used data, ideas, suggestions or words, whether they are transposed precisely (in original or translated) or paraphrased. I also certify that this work was prepared by me personally especially for the specific research or the specific course/seminar/curriculum”.

In the event that Faculty member is found has committed plagiarism, is referred by the President of the Department to the Ethics Committee of the Foundation.

The Department of Civil Engineering adopts the draft of the MO.DI.P. A guide against plagiarism, available at the following hyperlink:

<https://civil.duth.gr/undergraduate/>

2022-2023 ACADEMIC CALENDAR

WINTER SEMESTER

Duration Of Instruction

From 31-10-2022 to 23-12-2022 and
 From 09-01-2023 to 12-02-2023

Examination Period

From 13-02-2023 to 26-02-2023

Holidays

Friday 28-10-2022 (National Anniversary)
 Thursday 17-11-2022 (Polytechnic
 Anniversary)
 Friday 06-01-2023 (Epiphany Day)
 Monday 30-01-2023 (Feast of Three Holy
 Hierarchs)

Christmas and New Year's Holidays

From 24-12-2022
 to 06-01-2023

Local Holidays

Tuesday 04-10-2022 (Liberation of the city of
 Xanthi)

Repeat examination period for two semesters from Friday 01-09-2023 to Tuesday 29-09-2023

SPRING SEMESTER

Duration of Instruction

From 27-02-2023 to 07-04-2023 and
 from 24-04-2023 to 11-06-2023

Examination Period

From 12-06-2023 to 25-06-2023

Holidays

From Friday 24-02-2023
 to Clean Monday 27-02-2023 Saturday
 25-03-2023 (National Anniversary)
 Monday 01-05-2023 (May Day)
 Monday 05-06-2023 (Holy Spirit Day)

Easter Holidays

From M. Monday 10-04-2023
 to Friday 21-04-2023

Summer Vacation

From Saturday 01-07-2023 to Thursday 31-08-2023

DECLARATION OF QUALITY POLICY

The Department of Civil Engineering in cooperation with the Quality Assurance Unit (QMV) of D.U.Th. and the competent services of the Foundation has harmonized the Quality Policy of the Undergraduate Curriculum (MMA) and the Postgraduate Programs (PMS) and Doctoral Studies (PPS) offered with the Quality Policy of the Democritus University of Thrace.

Mission

The Department of Civil Engineering is committed to working closely with students, business, authorities and society to disseminate knowledge for the common benefit, improve everyday life and provide solutions to address global challenges. The JPM contributes collectively to society as it focuses on modern education through student-centered learning that is based on actions and experience, but also integrates digital transformation of sciences and profession. The Department trains Civil Engineers capable of engaging with the completion of their studies, in the study, in the design, composition, construction, supervision, in the maintenance of the built or landscaped environment, including, but not limited to, cities and infrastructure projects, roads, bridges, dams, buildings, industrial, craft and tourist facilities, tunnels, water and waste water treatment facilities, water and sewage projects and networks, ports, airports, transport networks, etc. (In detail see: 'Diploma Annex ICMP ICP'). Moreover, the Department, as it owes, prepares its graduates, following the developments on a global scale in all areas of science, research and the profession of Civil Engineer, making its graduates eligible and competitive in the labor market and academic environment. The Department provides education and research, with a balance in learning and application, through a modern and competitive international



at the level of a curriculum. Attendance at the ICP's JPM is a modern training experience for students as the JPM has: (a) modern facilities and laboratories, (b) highly trained staff, (c) internationally renowned scientific staff, (d) national and international scientific staff and students, (e) internal quality system, (f) extended student care, (g) presence on the international university ranking lists, with a prominent position in the evaluation of Greek university education.

Vision

The JPM's vision is the continuous effort of quality, excellence and discrimination, making it a leading part of the map of higher education both in Greece and in Europe. The JPM invests in student-centered learning, the educational process, the human resources, but also in research, contributing to society and successfully addressing the challenges of the modern era by using the means of modern digital technology.

Course Content

The object of the FRP of the LBB is:

- i) The creation through the training of a strong background in the science of Civil Engineering, through a student-centered learning process, which includes knowledge either classical or cutting edge technology, the acquisition of experience and practical application, analysis, synthesis and evaluation of data, limitations and possibilities.
- ii) The preparation and direction of the professional career, eligibility and competitiveness of its graduates through the understanding of science with modern technological means and methods, based both on literature, research and modern digital media.

- iii) The development of the ability of its graduates in the modern digital age, the ever-growing society, the rapid increase in knowledge and the changing requirements of the labor market, to continue their intellectual development and training, facing the fourth industrial revolution by acquiring new skills and competences,
- iv) Knowledge with the tool of research (basic and applied) in both areas of Civil Engineering and interdisciplinary fields, monitoring the developments of science and expanding its scope.
- v) Its contribution to the reconstruction and development of the wider region and the country, in cooperation with productive bodies and enterprises through self-energy, team work, excellence, research, innovation, production and entrepreneurship.

Please note that the JTF:

1. It has adopted the credit system (ECTS) in accordance with the Bologna Accord.
2. The RSP and the PCF include courses in which the performance of students is shaped through actions, work, midterm exams, alternative exams and not only by a final written examination (formative evaluation),
3. Uses experiential learning methods (e. educational tours, experiential workshops, laboratory tests, etc.).
4. All the courses taught under the MSF and the MFA have course contours, which mention the titles of the 13 lectures (syllabus) and identify precisely additional activities and what part of the total ECTS cover (tasks, progress, workshops, off-class activities, etc.).
5. It grants an Annex to the Diploma in Greek and English.

Operation

An organizational culture has been formed in the Department for the way it operates. Assembly days have a regularity, but are rotated so that the same lessons are not lost all the time. For all issues that arise, committees are set up, which, after having investigated them from all angles, are recommended to the General Assembly, which takes the final decisions. The computerization of the Department includes a number of information systems, such as (a) the Electronic Secretariat System (universis), (b) the Integrated Information System (IQS) of the ICP MOD, (c) the Project Management Information System (resCom) of the ICP ICP, (d) the Library Information System of the ICP, (e) the ICP Information System the ICP Electronic Assessment System; There are fixed procedures and stable rules for the allocation and management of funding from each source. The LVP's logistical infrastructure is state-of-the-art and in excellent condition, as it was recently built and delivered for use in 2016. There is regular monitoring, and to address any emergency problem prepared help desk of the LBB Technical Service, where any member of the LVP identifies it, registers it, so that it is either directly handled or planned to be restored. The workshop's logistical infrastructure is in good condition and is periodically renewed and maintained either from research funds, either from the regular budget, or from the submission of proposals to finance equipment of the AMTH Region or the central government. The arrangements for replenishing the courses are decided by the General Assembly to cover the 13 weeks of instruction provided for by law. There are traineeships, mobility regulations, etc. and are posted on the website of the Department, or of the D.U.Th. There are predefined procedures and rules for student selection and all procedures are completely transparent.

Strategic planning

The strategic objectives of the Department are linked to those of the Foundation and include:

- Providing high-level education, with an emphasis on student-centered learning, the continuous upgrading of the MSP and the MFA through the institutionalized annual review process of the MFA and the MFA and the updating and standardization of academic functions and focus on Learning Objectives and Learning Outcomes
- Improving the connection with the labor market, scientific bodies and graduates of the Department.
- To improve the production of high-level research based on international developments by promoting research cooperation and the exploitation and dissemination of results for the benefit of the economy and society.
- Support for Department funding through research programs by public and private bodies.
- Promotion and recognition of excellence and innovation by encouraging, strengthening and rewarding the achievements of students and members of the university community in teaching and research, successes in student competitions, discrimination in competitive submission of innovative proposals, student work awards, etc.
- Strengthening extroversion by strengthening and promoting partnerships,

networking and publicity actions and the international presence of the Department, through internationalization actions and benchmarking with universities of similar size, emphasizing the Department's distinction at local, national and international level.

- Efficiency of the administrative procedures and improvement of the infrastructure of the Department giving priority to Student Care and the strengthening of laboratory and educational equipment.
- Creation of a unique personality that makes the ICP ICP and its graduates unique in relation to the like Departments of higher education in Greece, attracting more students.
- Foster a two-way supply society between the academic community and students/graduates.
- Culture of quality and excellence.

At the same time, the strategic objectives of the Department are linked to the respective objectives of the Foundation which include:

1. Strengthening-upgrading the educational project.
2. Support-upgrade of research and of innovation.
3. Improve the amount and the absorption of funding.
4. Empowering and upgrading the human potential.
5. Strengthening and improving the management of the Foundation's infrastructure and services.



CURRICULUM

1st Semester

Num.	Course Title	Specialization A	Specialization B	Specialization C	ECTS	HOURS
1	FLUID MECHANICS OF HYDRAULIC STRUCTURES	Y	E	Y	6	3
2	ADVANCED ENGINEERING HYDROLOGY - FLOOD DEFENSE PROJECTS	E	Y	E	6	3
3	APPLICATIONS OF COASTAL ENGINEERING, COASTAL AND HARBOUR WORKS	Y	E	Y	6	3
4	WATER RESOURCES MANAGEMENT AND AQUATIC SYSTEMS RESTORATION	Y	Y	E	6	3
5	NUMERICAL METHODS IN FLUID MECHANICS	E	E	Y	6	3
6	SPECIAL TOPICS IN RESEARCH AND MANAGEMENT OF GROUNDWATER AND GEOTHERMAL ENERGY	E	Y	E	6	3
Total	Compulsory (Y) 3 courses, Selection (E) 2 of 3	5	5	5	30	15

2nd Semester

Num.	Course Title	Specialization A	Specialization B	Specialization C	ECTS	HOURS
1	SANITARY ENGINEERING AND SPECIAL TOPICS IN WASTEWATER TREATMENT	Y	E	E	6	3
2	NUMERICAL MODELLING OF PROCESSES IN THE MARINE / COASTAL ENVIRONMENT AND IN WATERSHED-COAST SYSTEMS	E	E	Y	6	3
3	SEDIMENT TRANSPORT AND MOUNTAIN HYDRODISTRIBUTION WORKS	E	E	E	6	3
4	HYBRID MODELS (STATISTICAL AND FUZZY) IN HYDRAULIC ENGINEERING	E	E	E	6	3
5	HYDROGEOINFORMATICS	E	Y	E	6	3
6	TECHNIQUES AND TOOLS FOR DEVELOPING METHODS OF WATER RESOURCES PROTECTION AND NATURAL DISASTER	E	E	E	6	3
7	RENEWABLE ENERGY: EXPLOITATION OF HYDRODYNAMIC AND MARINE ENERGY	E	E	E	6	3
Total	Mandatory (Y) 1 course, Option (E) 4 of 6	5	5	5	30	15

Specialization A: Hydraulic Structures and Environment

Specialization B: Water Resources and Natural Disasters Management

Specialization C: Maritime Engineering and Environment

SUMMER SEASON

	DIPLOMA DISSERTATION				15	
	Total ECTS:				75	



COURSES DESCRIPTION

Winter Semester

1 FLUID MECHANICS OF HYDRAULIC STRUCTURES

Teacher: Angelidis P.

Professor

This course will cover the following topics:

1. Hydrostatics - applications
2. Forces practiced on dams
3. Applications to forces exercised in dams
4. Cavitation Effect - Barbed Superflow Ventilators
5. Inflatable Dams
6. Bernoulli theorems - applications to flow problems
7. Bernoulli theorems - applications in non-permanent flow problems
8. Energy line, hydraulic gradient line, applications in water transport projects with closed conductors
9. Water turbines
10. Small hydroelectric projects
11. Dynamic and static stress from turbulent flow.
12. Turbulent flow, Reynolds equations
13. Turbulence models. Boundary layer

Once the course is completed, participant will be able to:

- To possess knowledge for the design and dimensioning of dams and inflatable dams
- To understand the dynamic and static stress from turbulent flow
- To apply the Bernoulli theorem for the design of various hydraulic works
- To analyze and calculate hydrostatic and other forces, exerted in various hydraulic works
- To combine and synthesize the knowledge he acquired, to deal with the phenomenon of cavitation in overflow and closed ducts
- Assess - in the context of the energy crisis - and plan small hydroelectric projects

Teaching Mode: 3 hours suggestion-exercises / week

2 ADVANCED ENGINEERING HYDROLOGY – FLOOD DEFENSE PROJECTS

<u>Teachers:</u>	Chrysanthou V.	Emeritus Professor
	Angelidis P.	Professor
	Spiliotis M.	Assoc. Professor
	Maris F.	Professor

The course covers the following topics:

1. Rain-drainage models: model Lutz, model Soil Conservation Service
2. Rainfall and drainage models: black-box and physical models based on the unit hydrograph
3. Empirical and semi-empirical methods of calculating potential and actual vaporization as rain loss
4. Hydrological methods of flood passage through a reservoir
5. Hydrological methods for transiting flood through river section (Muskingum)
6. Flood prevention projects: flood prevention and traffic,
7. Flood protection projects in the mountainous part of a watercourse basin
8. Drought indicators
9. Frequency analysis of maximum or minimum values of rainfall heights and water supplies
10. Time series analysis
11. Numerical examples
12. HEC-HMS Hydrological Software
13. Subject (work at home) for the implementation of Sections 1, 3, 4 and 6

Upon completion of the course the student is able to:

- To possess the knowledge for the calculation of the water supply due to rainfall at the outlet of a catchment area.
- To possess the knowledge for the calculation of potential and actual vaporization as a category of rain losses.
- Apply his knowledge to the passage of a flood wave through a reservoir or through a section of a river.
- To combine his knowledge to design and dimensionalize flood containment and transit projects, as well as projects in the mountainous part of a watercourse basin.
- Assess whether there is extensive drought in a water catchment area.
- Evaluate the incidence of maximum or minimum values of rainfall heights and water supplies.
- To understand the extension of time in an artificial way of an existing time series of measured water supplies.
- Implement and understand HEC-HMS hydrological software.
- To combine his knowledge in order to be able to carry out hydrological studies in practice.

Teaching Mode: 3 hours suggestion-exercises / week

4 WATER RESOURCES MANAGEMENT AND AQUATIC SYSTEMS RESTORATION

<u>Teachers:</u>	Akratos C.	Associate Professor
	Kagalou I.	Professor
	Spiliotis M.	Associate Professor

The course covers the following topics:

1. Physical-chemical-biological processes in aquatic ecosystems
2. River basin management
3. Analysis of pressure in the catchment area/ uses and assessment
4. Indicators of the qualitative situation - Framework Directive 2000/60
5. Groundwater and the environment
6. Brackling of groundwater
7. Artificial groundwater enrichment
8. Water scarcity and water scarcity indicators, distinguishing between water scarcity and causes
9. Water demand.
10. Surface water potential of a water catchment area
11. Projects for the development of surface water resources
12. Comprehensive EDP with multiple criteria and choice of weights

Once the course is completed, participants will be able to:

- Knowledge of river basin management plans
- Understand water basin uses/pressures
- Apply quality assessment indicators
- Know technical and alternative rehabilitation methods
- Be aware of the principles of green infrastructure and nature-based solutions.
- Be aware of groundwater management issues
- Be familiar with techniques for treating groundwater brining
- Water scarcity and water scarcity indicators, distinguishing between water scarcity and causes
- Apply basic principles to the determination of water demand.
- Be able to estimate the surface water potential of a water catchment area and design a reservoir (from a hydrological point of view)
- Optimize the EDP
- Make complete EDP with multiple criteria and choice of weights, distance methods, entropy method and AHP for determining weights

Teaching Mode: 3 hours suggestion-exercises / week

5 NUMERICAL METHODS IN FLUID MECHANICS

<u>Teachers:</u>	Samaras A.	Ass. Professor
	Angelidis P.	Professor
	Spiliotis M.	Assoc. Professor

This course will cover the following topics:

1. Finite Volumes I Method: Introduction and Spatial Differentiation (Computation Network Information and Variable Distribution),
2. Finite Volumes II method: Gauss theorem and calculation of flow quantities through the surfaces of computational cells.
3. Finite Volumes III method: Interpolation schemes, temporal differentiation and linear system solving.
4. OpenFOAM I Open Source Computational Engineering Software: General introduction to the structure, installation and basic use of the software.
5. OpenFOAM II Open Source Computational Fluid Engineering Software: Computational geometry design, creation and modification of computational networks.
6. OpenFOAM III Open Source Computational Fluid Engineering Software: Linear solvers, pressure-speed coupling, spatial and temporal discretization schemes.
7. OpenFOAM IV Open Source Computational Fluid Engineering Software: Simulations of permanent and non-permanent flows, introduction of initial and boundary conditions, running simulations with parallel processing.
8. OpenFOAM V Open Source Computational Fluid Engineering Software: Data processing during calculations, initialization and modification of resolution fields
9. OpenFOAM VI Open Source Computational Fluid Engineering Software: Data transformation, development of complex boundary and initial conditions,
10. OpenFOAM VII Open Source Computational Fluid Engineering Software: Qualitative and quantitative processing of resolution results.
11. Applications in the simulation of complex flows I: Turbulent flows and free surface flows.
12. Applications in the simulation of complex flows (I: Multiphase flows, particulate flows and diffusion flows).
13. Personalized Work Semester: Presentation, Assignment, Elaboration with interactive teaching (solving queries and class corrections).

After the section is completed, the participants are able to:

- They understand the basics of numerical analysis.
- They understand the basic equations of hydraulic and their methods of numerical solution.
- They understand the mathematical description and analysis of fluid mechanics problems.
- Analyze, understand and modify computational codes.
- Evaluate the correctness of numerical results and decide alternative strategies for resolution.
- They use programming tools for different applications (Civil Engineering problem solving, management, analysis and graphical data representation).

Teaching Mode: 3 Hours Suggestion-Workshop / Week

6 SPECIAL TOPICS IN RESEARCH AND MANAGEMENT OF GROUNDWATER AND GEOTHERMAL ENERGY

Teachers: Diamantis I., Emeritus Professor
 Pliakas F.-K., Professor
 Kazakis N., Assis. Professor

The course includes the following sections:

1. Elements of Hydrology, Groundwater Plumbing and Applied Hydrogeology
2. Marine penetration in coastal underground water bodies - 1 (hydraulic and hydrochemical elements, modern response trends and management parameters)
3. Marine penetration in coastal underground water systems - 2 (international and Greek experience) - Exercises
4. Management of groundwater enrichment - 1 (natural groundwater enrichment and climate change, methods, selection criteria, design and operation of artificial groundwater enrichment projects)
5. Management of groundwater enrichment - 2 (hydraulic, hydrogeological, technical and managerial elements of modern approaches, scientific activities)
6. Management of groundwater enrichment - 3 (surveys and applications in the international field and in Greece) - Exercises
7. Simulation of groundwater and computational codes - 1 (hydrogeological dummy, classification of simulation models of groundwater)
8. Simulation of groundwater and computational codes - 2 (computational codes, general principles of evaluation of simulation models of groundwater, cases of application in Greek space) - Exercises
9. Geothermal systems - Geothermal fields
10. Geothermal field survey methods
11. Geothermal Energy Applications: Direct Uses
12. Geothermal Energy Applications: Electricity Generation - Shallow Geothermal Energy
13. Problems: Environment - Economy - Management

After completing the course, the participants are able to:

- Identify hydraulic characteristics, elements and properties of groundwater bodies
- Combine, compose and adapt data, data and results of hydrological and hydraulic surveys and studies of groundwater
- Compare, assess the options for implementing actions and decide on the design and construction of technical projects, relating to the development and management of groundwater bodies, in particular: (i) the management of groundwater enrichment, (ii) the exploration and treatment of marine intrusion in coastal aquifers.
- To select and apply appropriate computational codes in the context of the simulation of groundwater.
- To analyze and evaluate data, data and research results related to the utilization of geothermal energy and to solve problems of use and exploitation of geothermal energy in relation to the various relevant energy needs and environment.

Teaching Mode: 3 hours suggestion-exercises / week

Spring Semester

7 SANITARY ENGINEERING AND SPECIAL TOPICS IN WASTEWATER TREATMENT

Teachers: Akratos C. Associate Professor
 Kagalou I. Professor

The course includes the following sections:

1. Concepts and Themes of Health Engineering (Contamination, Pathogenicity, Epidemiology Data, Waterborne Infections).
2. Waste water treatment methods.
3. Design/dimensioning conventional treatment plants with suspended biomass methods such as activated sludge, plants with attached biomass methods as well as natural wastewater treatment systems such as artificial wetlands and stabilization lakes.
4. Learning of waste water treatment plant design software Aqua Designer 8.1. and the budget calculation software of CAPDET processing units.
5. Modern trends in advanced wastewater and industrial wastewater treatment as well as sludge management.
6. Analytical biological adhesive and suspended growth processes for the removal of nutrient salts and micro-pollutants are presented, the modern trends in the treatment of liquid waste (MB R reactors, MBBR).
7. There are differences in methods of treatment of industrial and agro-industrial waste (anaerobic treatment, biological filters, membranes, natural treatment systems).
8. Modern methods for sludge treatment are presented (anaerobic digestion, energy utilization, nitrogen and phosphorus recovery from sludge).

After successful completion of the course the student is able to:

- Recognize the subject of Health Engineering.
- Apply mathematical water quality models.
- Analyze physico-chemical and biological/microbial indicator data.
- To combine and synthesize the acquired knowledge to protect aquatic systems and to respond to health crises
- To evaluate the health status of water bodies.
- To study, design, build, sewage treatment plants
- Know new techniques for urban and industrial waste water treatment

Teaching Mode: 3 hours suggestion-exercises / week

8 NUMERICAL MODELLING OF PROCESSES IN THE MARINE / COASTAL ENVIRONMENT AND IN WATERSHED-COAST SYSTEMS

Teachers: Samaras A. Assis. Professor
Katopodes E. E.D.P.

The course includes the following sections:

1. Process description equations in marine and coastal environment.
2. Numerical resolution methods and techniques.
3. Computational dummy structure.
4. Processing and analyzing field data and computational dummy input/output data.
5. Computational Dummy Applications I: Wind/Wave Circulation;
6. Computational dummy applications I: Ripple propagation
7. Computational dummy applications III: Estimating stereotransfer and morphodynamic changes.
8. IV Computational Dummy Applications: Project Interaction - Coastal Environment.
9. V modeling applications: Diffusion of oil pollution.
10. Holistic approach to simulation of Basin - Coast Systems (WACS) I: Methodology.
11. Holistic approach to simulation of Basin - Coast Systems (WACS) II: Tools.
12. Holistic approach to simulation of Basin - Coast Systems (WACS) III: Applications.
13. Personalized Work Semester: Presentation, Assignment, Elaboration with interactive teaching (solving queries and class corrections).

After completing the course, the participants are able to:

- They understand the process description equations in marine and coastal environments.
- They understand numerical resolution methods and techniques.
- They understand the structure of computational models.
- Understand the techniques of processing and analyzing field data and computational dummy input/output data.
- They understand the techniques of applying computer models.
- They understand the principles of a holistic approach to simulation of Basin-Coast Systems (WACS), with an emphasis on estuary systems and the coastal environment.
- They combine and apply the knowledge gained for the development and application of computational models to the above.

Teaching Mode: 3 Hours Suggestion-Workshop / Week

9 SEDIMENT TRANSPORT AND MOUNTAIN HYDRODISTRIBUTION WORKS

Teachers: Chrysanthou V.,
Maris F.,
Avgeris L.

Emeritus Professor
Professor
Candidate Doctor

The course covers the following topics:

1. Introduction. Physical properties of water
2. Flow characteristics
3. Fertile material properties. Sedimentation rate
4. Start moving fertile materials
5. Bed formations
6. Transportation of cargo bed. Transportation of cargo of suspended materials
7. Transport of total cargo
8. Localized erosion
9. Fertile transport models
10. Mountain hydronomy projects: Effect of fertile materials
11. Numerical examples
12. HEC-RAS Hydraulic Software
13. Topic (working at home) on the implementation of HEC-RAS

After successful completion of the course the student is able to:

- To apply basic knowledge of Hydraulics in the phenomenon of the transfer of fertile materials in watercourses and rivers.
- Evaluate grain curves.
- To possess the knowledge for the calculation of the sedimentation rate of suspended ferrals, critical flow rate and critical trolling voltage on the riverbed.
- To understand the effect of bed formations on the water flow and the transport of fertile materials on a river bed.
- To apply the appropriate equations for the calculation of load carrying bed and total load.
- Apply diffusion theory to the calculation of the transport of suspended ferments.
- Analyze the factors affecting local corrosion effect on bridge pedestals, downstream of barriers and open duct strictures, so as to be able to estimate the maximum depth of local corrosion.
- To apply the relationships between horizontal lengths, flow depths, ferryl densities and ferryl grains diameters to the physical models of the laboratory.
- To combine knowledge to design and dimensionalize a sedimentation tank.
- Evaluate the impact of fertile materials on mountain water projects.
- To implement the HEC-RAS hydraulic software with slide transfer.

Teaching Mode: 3 hours suggestion-exercises / week

10 HYBRID MODELS (STATISTICAL AND FUZZY) IN HYDRAULIC ENGINEERING

Teachers: Spiliotis M. Assoc. Professor
Papadopoulos B. Professor

The course covers the following topics:

1. Fuzzy logic and sets
2. A-sections
3. Compound incision and complement
4. Unclear numbers and extension of the rule
5. Comparison of fuzzy logic and statistics-fuzzy estimators
6. Max-min composition, vague logic
7. Intelligent systems with fuzzy logic
8. Fuzzy optimization
9. Fuzzy Multicriterion Analysis
10. Applications in Hydrology
11. Applications in the EDP
12. Applications in the EDP
13. Applications in the EDP

After successful completion of the course the student is able to:

- He distinguishes classical logic from fuzzy logic
- Elementary mathematical documentation of fuzzy logic
- To distinguish in which cases the ambiguous approach contributes to the problem and in which cases the classical approach or a hybrid approach is preferred
- Be able to apply intelligent systems to hydrology
- Be able to apply unclear systems to EDP decision-making

Teaching Mode: 3 Hours Suggestion-Workshop / Week

11 HYDROGEOINFORMATICS

<u>Teachers:</u>	Maris F.,	Professor
	Iliadis L.,	Professor
	Papaioannou C.,	Assis.Professor
	Papaleonidas A.,	E.D.I.P.

The course covers the following topics:

1. Introductory Concepts of Water Resource Management.
2. Water management software and systems.
3. Geospatial data for hydrology, spatial detail and map scale, coordinate reference systems (datum), data representation, metadata, digital terrain model.
4. Format hydrological data, check homogeneity, fill in, and extend data time series.
5. Surface formation, geospatial data production from point measurements, surface creation methods. Spatial variability.
6. Modeling of evaporation. Modeling of filtration. Hydraulic roughness and hydraulic drainage.
7. modeling hydrological processes.
8. Modeling of the unit hydrograph.
9. Development of reliable NON-linear estimation models of dependent hydrological variables
10. Development of N-dimensional non-linear ranking models (N dimensional classification) in water resource management using Computer Intelligence-Machine Learning
11. Artificial Neural Networks (NTN)
12. Support Vector Machines (MDY)
13. Fuzzy Logic (AL).

Software: Torrential-MIK, Esri ArcGis, Arc Hydro, Hec-Hms, Hec-Ras, Iric, Telemac, Erdas Imagine, Trimble eCognition, MATLAB 2016, WEKA (free open source), Neuralworks Professional II PLUS.

After successful completion of the course the participants are able to:

- Generate the primary input data of the models using Geographic Information Systems and remote sensing techniques.
- Model hydrological processes.
- To shape and solve water resource problems as optimization problems.
- Create and optimize water resource models that will act as decision support systems.
- Be able to develop non-linear models for estimating dependent hydrological variables.
- Assess the suitability for use of Computational Intelligence-Machine Learning techniques
- Propose and implement appropriate decision-making tools related to water problems.

Teaching Mode: 3 Hours Suggestion-Workshop / Week

12 TECHNIQUES AND TOOLS FOR DEVELOPING METHODS OF WATER RESOURCES PROTECTION AND NATURAL DISASTER PREVENTION

Teachers: Kazakis N., Assis. Professor
Pliakas F.-K., Professor

The course covers the following topics:

1. Introduction to water resources - Natural disasters. Repetition of basic concepts in hydrogeology
2. Vulnerability and risk of groundwater
3. Flood risk
4. Examples from the international literature
5. Indicator methods, hybrid models, simulation models
6. Utilization of Geographic Information Systems in the development of new methods
7. Analytical Hierarchical method for determining gravity
8. Optimizing methods with correlation coefficients
9. Optimizing methods with sensitivity analysis
10. Development of a method for assessing groundwater vulnerability
11. Development of a method for assessing the risk of flooding
12. Development of methods for identifying infrastructure sites
13. Evaluation and verification of the reliability of methods. Repetition/summary of the material - Presentation of Issues

At the end of the course the student is competent:

- To understand the concept of ground water vulnerability, flood risk and landslide susceptibility
- To classify parameters that affect the vulnerability of groundwater, the risk to flooding phenomena and the susceptibility to landslides
- Recognize indicator methods, hybrids and simulation methods
- To utilize the method of Analytical Hierarchical Analysis
- Use the Geographic Information Systems and their tools for hydrological, hydrogeological and morphological data processing to develop new methods
- To propose and design methods for the protection of water resources
- Assess methods of protecting water resources and preventing natural disasters
- Develop and present a theme related to the protection of water resources and the prevention of natural disasters

Teaching Mode: 3 Hours Suggestion-Workshop / Week

13 RENEWABLE ENERGY: EXPLOITATION OF HYDRODYNAMIC AND MARINE ENERGY

Teachers: Chrysanthou V., Emeritus Professor
Lalikidou S., Candidate Doctor

The course covers the following topics:

1. Technical works for capturing, abducting and abducting water
2. Characteristics and types of reservoirs
3. Flood containment and water storage reservoirs design and dimensioning
4. Technical security projects - Dimensions of security launcher and floor evacuation
5. Topics (homework) on the design and dimensioning of reservoirs
6. Application of optimization methods to reservoir management
7. Regeneration tower: water level oscillation equations, hydraulic shock, unstable flow within closed conductors
8. Drop duct: pipe diameter selectors, static investigation of the duct supports
9. Spiral shell: specifying spiral shell rays
10. Hydroturbines: hydroturbine classes, action hydroturbine function, reaction hydroturbine function
11. Hydroturbine output conductor: output conductor configuration, cavitation
12. Marine wave motion, energy and power
13. Provisions for the generation of electricity through wave energy. Tidal wave power, tidal range power. Provisions for the generation of electricity through the tides. Numerical examples.

At the end of the course the student is competent:

- To possess knowledge for the design and dimensioning of flood containment and water storage reservoirs, as well as for the dimensioning of the safety drawer and the floor evacuator.
- Understand the parameters for the design and dimensioning of the regeneration tower and to study the propagation of the hydraulic shock.
- Apply the knowledge for the design, dimensioning and static investigation of the fall duct.
- Combine the knowledge for the design and dimensioning of the spiral shell.
- Evaluate knowledge on the selection of the type of water turbine.
- To evaluate the knowledge on the design and dimensioning of the outlet pipeline of the water turbine taking into account the phenomenon of cavitation.
- Possess theoretical knowledge of motion, energy and sea-wave power in order to understand how the relevant power generators operate.
- Possess theoretical knowledge of tidal current and tidal range power in order to understand how the relevant power generators are operated.

Teaching Mode: 3 hours suggestion-exercises / week

LEARNING OUTCOMES



The learning outcomes of the Master Program "Hydraulic Engineering and Environment" are per Specialization the following:

The Specialization "*Hydraulic Structures and Environment*" aims to specialize students in the design, study, construction, maintenance and repair of Hydraulic Works with a strong environmental character. More specifically, after the completion of their studies the graduate students will be able to:

- They are aware of the production of independent and original scientific research on Hydraulic Engineering and the environment.
- They understand the interaction of hydraulic works with the environment as a result of the basic design parameters.
- They understand the physical, chemical and biochemical processes of water systems and describe how to restore them.
- They apply the knowledge gained in the design, dimensioning and calculation of hydraulic works, such as water supply, sewerage, water treatment, liquid and solid waste, sludge, industrial wastewater, waste water disposal to receiving water, environmental technology, etc.
- They analyze the hydraulic works in the individual components, relate them to the various charges, and clarify their effect.
- They compose and design the structure of hydraulic works, choosing the most appropriate way of mathematical modeling and aiming at the best technical, economic and environmental result.
- They shall assess the impact of hydraulic works on the environment and decide to redesign them, defending as far as possible the reduction of adverse environmental effects.

The Specialization "*Water Resources and Natural Disasters Management*" aims at the specialization of students in the design, study, construction, maintenance and repair of Water Projects, related to water resource management, the hydrology of surface and underground waters, land reclamation, hydrodynamic, flood protection projects, mild forms of energy, natural disaster management. More specifically, after the completion of their studies the graduate students will be able to:

- They are aware of the production of independent and original scientific research on the issues of Water Resources and Natural Disasters.
- They understand the harmonious relationship between water resources, centers of consumption and the environment with a view to sustainable development.
- They understand the management of groundwater, the issues of utilization of geothermal energy and in general mild forms (hydrodynamics, wind, marine).
- They apply the knowledge gained in the design, dimensioning and calculation of hydraulic and other projects, with the aim of meeting water demand as far as possible, protecting water resources and the environment, and protecting against extreme hydrometeorological phenomena and natural disasters.

- They analyze the levels of complexity in managing water resources.
- They classify the alternatives and set the appropriate criteria for their evaluation.
- They compose the structure of solutions based on feasibility (technology, means, local technical conditions), but also social, economic and environmental considerations.
- They evaluate alternative solutions to projects, development programs and management policies, using multi-criteria methods.

The Specialization "*Maritime Engineering and Environment*" aims at the qualification of students in the design, study, construction, maintenance and repair of port projects, coastal protection and management projects of the coastal zone, static and dynamic analysis of marine structures, the management and configuration of land area of ports and marinas. More specifically, after their completion students will be able to:

- They are aware of the production of independent and original scientific research on marine projects and the environment.
- They understand the coastal natural processes, the natural oceanography, as well as the marine ecosystem.
- They shall apply the knowledge gained in the design, dimensioning and calculation of coastal protection and coastal zone management projects, port projects, marine structures, port and marinas land development projects.
- They analyze levels of complexity in the design and management of port and coastal projects.
- They classify the alternatives and set the appropriate criteria for their evaluation.
- They compose the structure of solutions based on feasibility (technology, means, local technical conditions), but also social, economic and environmental considerations.
- They shall assess the environmental impact of the projects planned using a research methodology and simulation using numerical methods.

USEFUL HYPERLINKS

HYDRAULIC ENGINEERING AND ENVIRONMENT

<https://civil.duth.gr/postgraduate/>

Regulation of the Academic Adviser in the Department of Civil Engineering

<https://civil.duth.gr/undergraduate/>

Traineeship Regulation

<https://civil.duth.gr/undergraduate/>

Mobility Regulation Erasmus <https://civil.duth.gr/undergraduate/>

Master's Program Regulation "Hydraulic Engineering and Environment"

<https://civil.duth.gr/postgraduate/hydraulic-engineering-and-environment>

Regulation of the Postgraduate Studies Program "Applied Mathematics"

<http://mapmath.civil.duth.gr/>

Regulations (old and new) of Doctoral Thesis Preparation

<https://civil.duth.gr/>

Post-Doctoral Program Regulation

<https://civil.duth.gr/>

Guide Against Plagiarism

<https://civil.duth.gr/undergraduate/>