



**École Nationale Polytechnique de Constantine
(E.N.P.C) - Malek Bennabi**



L'École Nationale Polytechnique de Constantine (ENPC), created by Executive Decree No. 11-400 of 3 Moharram 1433 corresponding to November 28, 2011, is an institution of higher education

higher education institution resulting from the program of support of the quality of higher education in Algeria. Located in the university town Ali Mendjeli, Constantine, the school has a capacity of 4,000 teaching places on an area of 14,750 m² of basic infrastructure and 17,981 m² of technological halls. It comprises:



7 Amphitheatres of 200 places et 1 Amphitheater of 300 places



50 TD classes of 30 places

40 TP Laboratories of 30 places



1 Library of 1,000 places for students



Each department has a computer room :

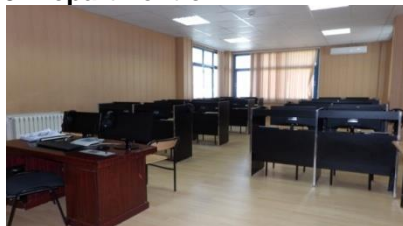
1. Department of Mechanical Engineering



2. Department of proceeding engineering



3. Department of E.E.A



3. Département of materials engineering :



3 Multimedia rooms of this type



2 language laboratories of 16 places



1 Big conference room of 270 places



2 defense rooms



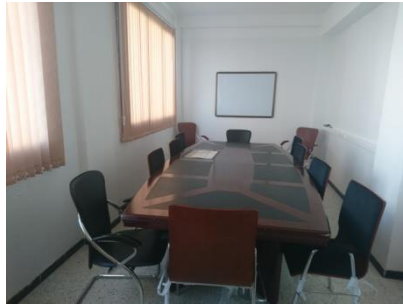
1 Small conference room of 70 places in the first floor



1 Big meetings room of 20 places (ground floor)



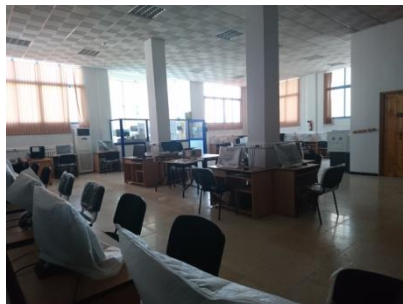
2 meeting rooms of 10 places in the fourth floor



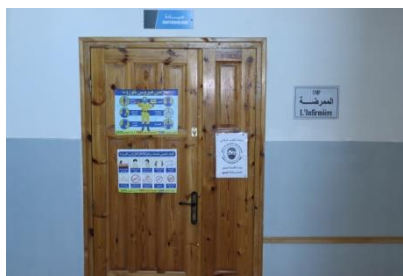
1 meeting room of 10 places in the second floor



Calculating center of 30 places



An infarmacy



Treatment room



Doctor's office



Psychologist office



As far as the pedagogical and scientific organs are concerned, the ENPC has

- a board of directors
- a board of directors
- a scientific council
- five (5) scientific committees
- departments
- a quality assurance unit
- quality assurance unit
- an entrepreneurship house

- of a University Ethics and Deontology Council
- of joint commissions
- of disciplinary commissions
- of a contracting commission

The ENPC is accessible through a modern road network and is now served by the extension of the tramway from the city center of Constantine and by penetration of the East-West highway (in both directions). It offers a modern environment and is equipped with the latest technologies allowing its students to explore their chosen fields. It officially opened its doors to receive its first students on September 1, 2014. The first class of engineers (Malek Bennabi class) graduated in June 2017.

In accordance with the decree establishing non-university schools of higher education, it provides higher education and scientific research and technological development missions, within the framework of the public higher education service.

In terms of higher education, the emergence of the mechanical, energy, electrical engineering, automatic, process engineering and advanced materials, has enabled the school to identify the human resource needs of large companies and SMEs in the public and private industrial sectors of eastern Algeria (and even beyond) and then offer training that meets these needs.

It is on this basis, and after having met the necessary conditions (recruitment of experienced and high-level teachers, and young doctors for these specialties, ordering the necessary TP and research materials, upgrading, receiving and equipping the teaching premises,...), that the school opened its doors in September 2014 and that access was made directly to specialties for a training of three years, after successful completion of the preparatory studies in Engineering Sciences, or else the Common Core of Technology, and the national competitive examination for access to higher education.

The school currently has six (6) specialties in four (4) departments. However, two new specialties will be opened in September 2023 in two departments if they are approved by the CPNE of MESRS. We will then have :

*** in the Department of Materials Engineering:**

1st specialty: Materials Engineering.

2nd specialty: Photovoltaics and solar energy.

*** and in the Department of Process Engineering:**

1st specialty: Environmental Engineering.

2nd specialty: Pharmaceutical Engineering.

1- Department of Mechanical Engineering :

Description

Mechanics is a broad discipline that can touch several fields of industrial and domestic activities. In our department, this discipline is divided into two major options:

1.1 Energetics

1.2 Mechanical Construction and Manufacturing.



Areas of application

Wherever there are machines or instruments, there are mechanical engineers to design, install and operate them. Energy is also an area of study and fundamental

research for the mechanical engineer. They develop machines that are used either to produce energy or to convert it into heat or cold. Renewable energies will be the priority of this specialty.

Positions to be filled

The mechanical engineer is :

- o Research and development engineer.
- o Design office engineer.
- o Methods and industrialization engineer.
- o Quality engineer.
- o Maintenance engineer.

Employers

There are several categories of organizations or companies where the mechanical engineer can work.

Examples include.

1- Companies on a national scale

- o SONATRACH: the oil and gas industry.
- o SONEGAS: company in charge of the production, transport and distribution of electricity and gas in Algeria.
- o ADE and SEACO: companies that manage the water sector in Algeria.
- o COSIDER: main actor of the building and public works in Algeria.
- o AIR ALGERIE, TASSILI AIRLINES : Airline companies.
- o ONAB : food processing company.
- o SNVI : National company of industrial vehicles, and the private manufacturers of vehicles.

2- Enterprises on a regional scale regional

- o The steel complex of El-Hadjar, ANNABA.
- o ENPC : National company of plastic and rubber, SETIF.
- o GAZODUC and OLEODUC: SKIKDA.
- o Gas liquefaction unit of SKIKDA.
- o Refinery of SKIKDA.

3- Enterprises at the local level

- o ENMTP : public works equipment company Constantine.
- o ALEMO : equipment and machine tools Constantine.
- o PMAT : production of agricultural machines Constantine.
- o NAFTAL GPL : distribution of petroleum products Constantine.
- o Cement factory of Hamma Bouziane : Constantine.
- o Gas and combustion : Constantine.
- o SEACO : Water and Sanitation Company of Constantine

As well as opportunities in private companies and design offices, and in the technical and professional education corps.

A number of engineers can specialize and continue their training at the doctoral level. The opportunities for these candidates are becoming more and more numerous in research and development centers and laboratories, in university teaching, etc.

2- Department of Materials Engineering :

Description

Les Materials Science and Engineering is the branch of modern science that is concerned with the study of the structures and functional characteristics of polymers, metals, ceramics, composite materials, nanomaterials and innovative materials in order to understand and even predict their behavior in service. It relies on basic sciences such as physics and chemistry, as well as on all the engineering fields of mechanical and chemical engineering. Thanks to a high level of training, the engineer in Materials Engineering can be both a generalist and a specialist at the same time.

Moreover, each student engineer is led to build his personal and professional project from the 3rd year with the help of a tutor teacher, as he can obtain a doctorate at the ENPC, if he

succeeds in the doctoral entrance exam and shows good research skills. They can also be helped to set up their own company or SME if their end of study project is innovative.

In our department, this discipline is divided into two major options:



1- Génie des matériaux

Fields of application:

The engineer in Materials Engineering participates in all stages of the development, design, manufacture and use of materials. The ceramic or polymer industries, energy, metallurgy, pharmaceuticals and other developing sectors such as biomedical, composite materials, micro and nanotechnologies, dental materials, steels, telecommunications, as well as aeronautics and aerospace, are always looking for the skills of Materials Engineering engineers.

Positions to be filled: Engineers will be able to perform various functions:

- Study and design engineer
- Research engineer in university and industrial laboratories and in research centers.
- Development engineer for new systems.
- Manufacturing and construction engineer
- Control and quality engineer

.Employeurs

o Educational institutions: universities and colleges, research centers: Nuclear Research Centers (CRNA, CRNB and CRND), Research Center for the Development of Advanced Technologies (CDTA), Research Center for Semiconductor Technology for Energy (CRTSE), Research Center for Renewable Energies ...

o The energy industries: Sonatrach and Sonelgaz,

o Metal processing and manufacturing companies: El Hadjar Steel Complex (Annaba), Algal+ Aluminum Complex in M'sila, Excavator and Crane Complex, military machine building industry, foundries, etc.

o Cement factories,

o Heavy construction and automobile manufacturing industries: SONACOME, GERMAN, Renault...

o Companies and SMEs manufacturing ceramics,

o Pharmaceutical industries,

o Agro-food industries,

o Medicine and dental surgery.



2- Photovoltaics and solar energy

Areas of application:

The Photovoltaic and Solar Energy engineer is specialized in the optimization of materials used in the manufacture of solar cells and solar energy production systems, as well as in the design, manufacture and installation of solar energy and electricity production systems. They may work in the following areas:

- o The design, development and manufacture of new materials for solar cells ;
- o The improvement of existing materials to optimize their efficiency;
- o Optimizing materials for specific applications such as integrating solar cells into buildings or electronic devices.
- o Electricity generation and distribution companies;
- o Companies specialized in the design and installation of solar systems;
- o Solar panel manufacturing industries;

Positions to be filled: Photovoltaic and solar energy

engineers can work in positions such as:

- o Research and development engineer;
- o Solar system design engineer;
- o Solar panel production and manufacturing engineer;
- o Solar system installation engineer;
- o Renewable energy project engineer.

Employers

- o The Algerian Company of Electricity and Gas (Sonelgaz);
- o The National Agency for the Promotion and Rationalization of Energy Use (APRUE);
- o The Algerian Company of Renewable Energies (SKTM);
- o The Center for the Development of Renewable Energies (CDER);
- o Société Algérienne d'Électricité de l'Ouest (SADEO);
- o The Société de Production de l'Électricité (SPE).

3- Process Engineering Department

Description

The training of engineers in process engineering of the ENP of Constantine aims to develop in a transversal way the capacities to :

Develop an approach based on process engineering (chemical and biochemical reaction, material and heat transfer, fluid mechanics, energetics, automation, mathematical tools...), to design, dimension, operate, improve, manage or market chemical, physical or biological transformation processes of matter and/or energy, taking into account the constraints of the targeted application sector

Take into account environmental problems and contexts by relying on a knowledge of the legislative and regulatory framework as well as on a theoretical and practical knowledge of environmental engineering.

Work in teams on multidisciplinary process engineering projects.

To develop complementary scientific and technical knowledge consistent with the student's professional project and with the professions and sectors targeted by the training

To train students for a career in production or engineering in the pharmaceutical, food, cosmetic and phytopharmaceutical industries,

To enable students to acquire the latest techniques in these industries

To provide graduate students with the additional knowledge required to address specific problems in the pharmaceutical industry.

In our department, this discipline is dedicated to Process Engineering with three areas.



Areas of Application:

Pharmaceutical processes are disciplines that aim to apply process engineering operations in the pharmaceutical industry for the manufacture of drugs.

Pharmaceutical engineering:

is a discipline that includes most of the technologies related to the formulation of drugs and their industrial production under conditions of optimal efficiency and meeting the strictest good manufacturing practices. This specialization therefore aims to train competent managers in this field.

Environmental Engineering: provides students with the

necessary skills to work in the prevention and treatment of industrial pollution, waste management, and the development of solutions to environmental problems in a context of sustainable development.

Chemical Engineering

In chemical engineering, chemistry, physics, economics and mathematics are put at the service of society. They convert raw materials and substances to make them more useful or profitable. They use syntheses from laboratories to make processes applicable in industry and in many sectors (agri-food, chemical, petrochemical, pharmaceutical, etc.). They are also involved in the design of industrial equipment.

In fact, the work of process engineers touches so many fields that it would be difficult to list them all. Their field of activity can evolve according to two main approaches. The first involves the development, implementation and operation of machinery and plants related to industrial chemistry. The second is focused on the development of various products, from a new beverage to a revolutionary plastic.

Positions to be filled:

Upon completion of this training, holders of the Process Engineering degree will be able to hold positions as:

- o Manager of a galenic development laboratory,
- o Industrial development manager,
- o Research manager,
- o Scientific and technical watch manager,
- o Project manager,
- o Production manager,
- o Manufacturing and/or packaging manager.
- o Production, management and distribution of drinking water manager
- o Responsible for the management of the sanitation sector
- o Responsible for the treatment of wastewater from all sources (industrial, agri-food, urban,...)
- o Responsible for the treatment and valorization of waste (solid and liquid)

- o Responsible for the treatment of gaseous effluents
- o Responsible for modeling and simulation of chemical processes
- o Responsible for sizing and expertise of water treatment plants.

Employers :

- o Energy industries: Sonatrach and Sonelgaz,
- o Cement factories,
- o Pharmaceutical industries
- o Food industries.
- o LDM, Neomedic, HUPP,
- o Zedpharm Group, Soidal, BIOGALINIC, ISOPHARM-
- o ALGERIE, Pharmaceutical Union
- o Water and wastewater treatment and management companies (SEACO and ONA)
- o Food, textile and dairy industries (Numidia,...)
- o Hygiene and security services in private and public establishments
- o Oil industry (SONATRACH, NAFTAL...)
- o Environmental engineering consultancies (environmental process sizing, impact studies, technical and economic calculations).

4. Department of Electronics, Electrical Engineering and Automation (E.E.A) :

Description:

The work of electricians and automaticians is omnipresent in our daily lives; one only has to think of all the machines and means of transportation that we use regularly. It is surprising to see how many companies and all sectors of activity can take on board E.E.A. graduates.

In our department, this discipline is divided into two major options:

4.1 Electrical engineering



Areas of Application:

The electrotechnical engineer is a generalist engineer with solid knowledge in the field of electrical engineering for the study, design and control of electro-energy systems.

He/she receives a high quality theoretical and practical training in the field of energy conversion in the broadest sense of the term, which is based on: electromechanical converters, power and control electronics, automation, electrical and HV networks, renewable energy, energy quality, industrial computing, simulation tools and software, etc.

This specialization will provide training adapted to professional insertion (several outlets in companies working in the field of electrical engineering):

- o Production (power plants), transport (EHV, HTA and HTB lines) & distribution of electrical energy ;
- o Electromechanical energy conversion (electrical machines);
- o Process control;
- o Electrical engineering;
- o Maintenance.

4.2. Automation

The profile of the State Engineer in Automation is a Bac + 5 training (3 years at the École Polytechnique for students coming from the preparatory training for the grandes écoles) whose field of application is multidisciplinary.



The trained engineer will have proven capabilities in modeling, identification, simulation, control, design and manufacturing of automation devices for all types of industrial

processes (electrical, aeronautical, chemical, petrochemical, steel, robotics, ...). The engineer must also be able to adapt to recent major developments in the field of automation and be familiar with the latest developments in relevant software.

His or her in-depth knowledge in the subjects considered fundamental as well as technical and/or scientific also allows him or her to serve in industry and scientific research.

Positions to be filled :

- o Design & Consulting Engineer
- o Design office engineer
- o Research and development engineer
- o Quality and safety engineer
- o Maintenance engineer
- o Business manager

Employers :

- o Sonelgaz
- o Kahrif ; SKMK ; SDE
- o Sonatrach ; Sonacome ;
- o Cement factories ; Transport (railways, tramway and metro);
- o Algeria Telecom ;
- o Design offices;
- o SMEs and SMIs.

5. Department of Preparatory Classes

At the same time, the ENPC has contributed to the setting up of the Classes Préparatoires, to which access is by way of a competitive examination on title (classification after Baccalauréat, mention Bien or more). This experience has enabled the School to improve its preparatory cycle programs

.5.1. Organisation des études

- The preparatory classes are integrated into the framework of the national schools of higher education, with small classes and reinforced pedagogical supervision.

- The timetable is divided between classes, tutorials, practical work



and continuous assessment.

- The teachers of the preparatory classes are available, play the role of tutor, receive individually the students who seek advice and accompany them in their work.

- Attendance at classes is compulsory (3 unjustified absences or 5 absences even if justified lead to exclusion)

5.2 Professional discovery

There is no internship during the two years. These classes are designed to prepare students for the entrance exam to the grandes écoles; the teaching is theoretical but supported by practical work to ensure quality training.

5.3 Admission

Admission is subject to the average and the option of the BAC, and to the availability of teaching places at the school.

5.4 Diplomas

The preparatory classes do not lead to a title, but give right to credits that can be used in the LMD system; the preparatory classes validate 120 credits at the end of the 2 years of study, which allow them to obtain equivalences in case of reorientation.

5.5 Course of study

Students are admitted to the second year of study on the basis of the results obtained in the semester exams and the continuous assessment.

Repeating a year is only allowed once in the preparatory class under certain conditions.

At the end of the preparatory cycle, a certificate describing the student's progress is issued. This measure allows the student who wishes to join a university for a bachelor's degree to benefit from the equivalence of the modules acquired in the field for which he/she has opted.

5.6 What happens next?

The National Superior Schools only recruit students from preparatory classes and from universities after they have passed the entrance exam to the Grandes Ecoles and have been officially directed by the Ministry to the ENPC. However, the

students of 1st year preparatory class of this academic year 2021-2022 and all the future new students will be automatically admitted without taking the competitive exam if they obtain the average during the 2 years of study and are classified among the (70% - this percentage is fixed annually by the minister). They can also take the competitive examination of other schools which reserve 30% (this percentage is fixed annually by the Minister) of teaching places for students who want to join them.

- The ENPC offers you an excellent engineering education in a unique university context.

- Specialties of the future with high level teaching and a judicious mix of theoretical knowledge and practical applications.

- The ENPC offers the possibility to the students of end of cycle of engineer to register in a formation of the doctoral school in the existing courses.

o Doctoral training

Since 2017 the School has provided high-level doctoral training in the following specialties:

For the year 2017/2018:

Process engineering

- Pharmaceutical Engineering:

- 3 positions

- Environmental Engineering:

- 3 positions

Materials engineering

Materials Engineering: 4 positions

For the 2018/2019 year:

Mechanical Engineering:

Energetics: 03 positions

Mechanical Construction and Manufacturing: 03 positions

Materials Engineering: 03 positions

Electrical Engineering:

Electrical Machines: 03 positions

Automation :

Automation and Systems: 03 positions

Automation, Industrial Computing: 03 positions

For the year 2020/2021:

Automation:

Automation and Systems: 03 positions

Automation, industrial computing: 03 positions

Mechanical Engineering:

Energetics: 03 positions

Mechanical Construction and Manufacturing: 03 positions

Materials engineering: 03 positions

Process engineering

Pharmaceutical Engineering: 3 positions

Environmental engineering :

3 positions

Process engineering :

3 positions

For the 2021/2022 year:

Electrical Engineering:

Electrical Machines: 03 positions

Doctoral theses defended in 2021/2022:

Process engineering: 02

Materials engineering: 01

Electrical engineering: 01

Automation: 01

Mechanical engineering : 01

o In terms of scientific research and technological development,

with the help of the Ministry and the DGRSDT, the ENPC was able to obtain the establishment of a technological platform "Elaboration of Materials and Manufacturing" composed of five technical platforms in the many technological halls available, justified on the one hand by the

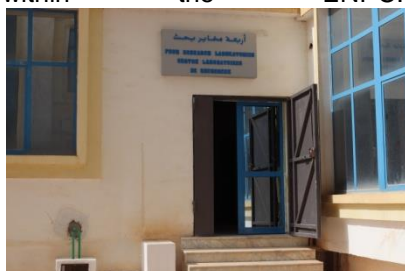
missions set to the school and on the other hand by the experience, level and national and international recognition enjoyed by its human potential. This platform is already operational and provides daily services to doctoral students and researchers throughout the country.

Research laboratories of the ENP Constantine

In addition, the researchers of the ENPC are grouped within four research laboratories to carry out their various research projects (PRFU, PNR and others and to supervise their doctoral students and students preparing the PFE) in order to contribute to the national effort of scientific research and technological development and to develop the results of scientific research and to disseminate the scientific and technical information



By Order No. 872 of October 01, 2018, and Order No. 205 of April 27, 2021 four (04) research laboratories have been created within the ENPC.



1- Laboratory of Electrical Engineering Polytech Constantine :

Directed by:
Prof. BOULKROUNE M'hamed
Laboratory Director, consisting
of four (04) teams:



o Research teams:

a. **Team 1: Intelligent Techniques for Diagnosis and Control of Electrical Systems (TIDCSE)**

b. **Team Leader:**

Dr BOUCHAREB Ilhem

c. **Members of Team 1:**

Researchers :

Dr. I. BOUCHAREB

Dr. F.REBAHI

Doctoral students :

I.DJELAMDA

S.KEDJOUTI

d. **Team 1 Objectives :**

- Multi-physics modeling of the various elements forming the automotive electrical system (power converters, motor, ...) for a real-time emulation;
- Design of intelligent embedded ADAS systems;
- Designing an automatic embedded ADAS system to solve a specific problem or task in VHEs.
- Vision (camera) identification approaches, technologies involving active sensors (Radar, Lidar, Ultrasound) and artificial intelligence (AI).
- Predictive and fault tolerant control.
- Towards advanced diagnostic applications in biomedical.

a. **Team 2: Automatic and its Applications**

b. **Team Leader::** Prof. BELARBI Khaled

c. **Members of team 2 :**

Researchers :

Prof. K. BELARBI

Dr. S. TENIOU

Dr. F. TITEL i

M.T.BELAKROUM

Doctorants :

H. BOUMAZA

M. HAMADOU

d. **Objectives of team 2 :**

- Control of nonlinear systems without delay and with variable delay
- Linear and nonlinear predictive control

- Adaptive control based on universal approximators such as artificial neural networks and fuzzy systems applied to networked systems

a. **Team 3: Study and Safety of Electrical Systems** **Chef d'équipe :**

Prof. LEBAROU Abdeselem

b. **Members of team 3 :**

Researchers :

Prof. A. LEBAROU

Dr. M. Makhoulf

Dr. A. Boumassata

Doctorants :

K.ATAMNIA

H.OULD LAHOUCINE

N.BOURAOUI

c. **Objectives of team 03 :**

- Optimization of motors dedicated to VHEs;
- Optimization of converter structures dedicated to HEVs;
- Multi-physics modeling of the HEV drive train

a. **Team 4: Analysis, Control and Monitoring of Advanced Systems,**

b. **Team leader :**

Prof. BOULAKROUNE

M'Hamed.

c. **Members of team 4 :**

Researchers :

Prof. M.BOULAKROUNE

Dr. T. ZABAIU

Dr. A. BOUAFASSA

Dr. S. BENSEGUNI

Doctorants :

N.DAHRAOUI

H.KARBOUA

K.BENAYAD

d. **Objectives of team 4 :**

- Diagnose systems (rotating machines, structures, etc.) by using acoustic and vibratory signals;
- Characterize defects using signal processing methods.
- Coordination of different control levels (structures) in electro-energy systems.

- Development of new tools (static and dynamic) for security assessment
- operation of electrical energy systems.

○ **Research projects PRFU :**

Project 1 Title: Towards advanced fault diagnosis of variable reluctance machines
Code: A01L07ES250120180001
Project leader : Lebaroud Abdesselam
Session : 2018
Project 2 Title: Design and use of a traction inverter for electric vehicles based on the technology of wide band gap components (Mosfet SiC, ...)
Code: A01L07ES250120220001
Project leader: Lebaroud Abdesselam
Session : 2022

○ **Objectives of the laboratory :**

- to bring together the skills of different specialties of the EEA department (Electronics, Electrical Engineering and Automation) to create a synergy between researchers from different teams.
- collaboration between national and international experts as well as inter-laboratory cooperation between laboratories is our credo.

1- Laboratory of Process Engineering for sustainable development and health products..

Directed by: Dr. SAOULI Ouacil
Laboratory Director, consisting of four (04) teams :



○ **The research teams:**

- Team 1: Waste Water Environment: Treatment and Recovery,**
- Team Leader:**
Prof. DERBAL Kerroum

c. **Team Members 1:**

Researchers :

Dr. I.BOUKERCHE
Dr. S. CHAOUCHI

Doctorants :

R. BOUAITA

d. **Objectives of Team 1:**

- Characterization and development of physico-chemical and biological processes for wastewater and drinking water treatment (in aerobic and anaerobic phase),
- Dimensioning and modeling of treatment processes as well as expertise of processes that are already in operation phase,
- Characterization of waste and proposal of treatment processes with recovery in the form of energy,
- Treatment and valorization of the biogas obtained from the biodegradation of biodegradable organic waste (anaerobic phase),
- Study of the kinetics and the mechanisms produced during the biological degradation of waste (to optimize and improve the efficiency of the process),
- Extraction of coagulants of organic nature for the improvement of water quality,
- Characterization and valorization of new biomaterials for water treatment by physico-chemical processes.

a. **Team 2: Processes, Polymer and Pharmacotechnics,**

- Team Leader:**
Prof. Bouzid Djallel

c. **Team Members 2 :**

Researchers :

Prof. Bouzid Djallel
Dr .S. TOUATI

Dr.N. FEGHMOUS

Doctorants :

A.DERBALI
Y.KESSIRA
F.Z. BADAoui

d. **Objectives of Team 2 :**

- Study and development of high-performance composite materials while respecting the environment,
- Study of the degradation and aging of materials in order to preserve the environment,
- To develop new materials and processes for vectorization and encapsulation of active ingredients in medicines.

- Team 3:** Chemical process engineering,

- Team Leader :** Dr SAOULI Ouacil

c. **Members of Team 3 :
Researchers :**

Dr. O.SAOULI
Dr. A. GHANEM LAKHAL
Dr. L. DJABALLAH

Doctorants :

N.KHIRI

d. **Objectives of Team 3 :**

- Design and adapt chemical manufacturing facilities,
- Use modeling and simulation tools allowing the transition from the pilot scale to an industrial scale,
- Combine the elements of hygiene, safety and environment.

- Team 4: Simulation and Optimization of Processes,**

- Team Leader :**
Prof. DJERAFI-KAABECHE Khatima.

c. **Members of team 4 :
Researchers :**

Dr. M.M.BENMOUSSA
Dr. M. BOUKELOUA
Dr. N. SLOUGUI

Doctorants :

A. NEKAA

d. **Objectives of Team 4 :**

- Simulate processes that allow manufacturers, on the one hand, to improve the efficiency and profitability of an existing process and, on the other hand, to design and simulate new production units,
- Design, control and optimize the operation of installations for the implementation of

material and energy transformations, Associate quality objectives with safety constraints and respect for the environment,

- Simulate phenomena at reduced spatial scales

○ **Research projects PRFU:**

Project: PRFU Code: A16N01ES250120200002

Project title: Improvement of the production of bioenergy from biodegradable waste,

Projet : PRFU Code : A16N01ES250120200001

Intitulé du projet : Nano-encapsulation des molécules actives-d'éveloppement et optimisation de nouveaux procédés,

Project: PRFU Code: A16N01ES250120210001

Project title: Dimensioning, design and realization of a fluidized bed membrane reactor for the synthesis of hydrogen,

Project: PRFU Code: A16N01ES250120190001

Project title: Optimization of energy consumption by simulation of energy recovery processes in the cement industry.

○ **Objectives of the laboratory:**

Study of the processes taken as a whole and their complexity, Meet the needs of the market and satisfy the needs of socio-economic partners (field of process engineering), Respond to requests for innovation and new product development, Propose clean processes with sustainable technologies.

2- Laboratory of Mechanics and Energy Systems,

Directed by: Prof. KHALFALLAH Salah Laboratory Director, consisting of four (04) teams :



The research teams :

a. **Team 1 : Mechanical and Biomechanical Modeling (M2B),**

b. **Team leader :**

Prof. KHALFALLAH Salah.

c. **Members of team 01 :**

Researchers :

Prof. KHALFALLAH Salah
Dr. MOUADJI Youcef
Dr. BOUDAA
Dr. KHEMMAR Leila

Doctorants :

F.REZGANE
O.ABID CHAREF
H.BENCHEIKH EL HOCINE
F. HEDJMESSAoud

d. **Objectives of the team 01:**

- Static and dynamic modeling of mechanical systems for applications to biological organs.
- Improvement of the processes of artificial implants.
- Analysis of the movements of mechanical systems to analyze those of biological organs.
- Numerical simulation of the organs to attacks and crashes (the fast dynamics)
- Study and analysis of the effects and parameters causing mechanical degradation of the biological organ.
- Simulation of blood flow phenomena and study of the problem of hypertension and hypotension.
- Minimization and passive and active control of vibrations.

a. **Team 2 : Advanced Materials Mechanics (M2A)**

b. **Team leader :**

Dr DJEBARA Abdelhakim

c. **Team Members :**

Researchers :

Dr. A. Djebara
Dr. M. Djennane
Dr. A. Ayachi
Dr. S. Sellami

Doctorants :

M .Alliche
F. Messaoudi

d. **Objectives of team 02 :**

- Optimization of manufacturing processes and characterization of innovative materials.
- Development of manufacturing processes for robust parts for technological and industrial applications.
- Development of design criteria.
- Surface treatment and machining of materials.
- Fatigue study of materials and structures

a. **Team 3 : Green Energy and Thermo-Fluids (EVT) Chef d'équipe :**

Prof. KAABAR Yacine

b. **Members of team 3 :**

Researchers :

Prof. Y. KABAR
Prof. M. AFRID
Dr. N. KHAROUA
Dr. A. HAMOUCHE
Dr. T. BOUKELIA

Doctorants :

Z.GUERMAT
B.BOUHBAL
M.DJENANE
I. BOUKHALFA

c. **Objectives of team 03 :**

- Production and storage of clean and sustainable energy for domestic or industrial use
- Use of biofuels as alternative fuels to reduce greenhouse gas emissions
- * Simulation of flow phenomena and heat and /or mass transfer.
- Energy efficiency of industrial systems and processes
- Control of energy consumption and environmental impacts,

especially in the building sector

a. Team 4 : Advanced Energy Systems

b. Team leader :

Dr SEMMARI Hamza

c. Members of team 04 :

Researchers :

Dr. H. Semmari
Dr. A. Filali
Dr. N. Ouzae

Doctorants :

A. HADDAD
A. ARAFI

d. Objectives of team 4 :

- Develop new models and processes
- Valorize research results by declining them in the form of marketable products.
- Solve technological problems related to mechanics in a general way in order to better support partners in the socio-economic sector

o **Laboratory objectives :**

- Modeling of mechanical systems and biological organs
- Simulation of the behavior of mechanical systems and biological organs to attacks (fast dynamics)
- Study of artificial implants
- Simulation of blood flow and study of problems of hypertension and hypotension
- Optimization of manufacturing and machining processes
- Surface treatment
- Rheological laws of advanced materials
- Production and storage of clean and sustainable energy for domestic or industrial use
- Simulation of the phenomena of flows and heat and or mass transfer
- optimization of energy consumption and environmental impacts
- Valorization of wind energies and thermodynamic solar energies
- Simulation of the flows of fluids containing nano-particles

- Improvement of the energy efficiency of the building, industrial systems and processes.

4 - Advanced Materials Technologies Laboratory,

Directed by :

Dr CHETIBI Loubna Laboratory Director, consisting of four (04) teams :



a. Team 1 : Nanomaterials (NanoMat)

b. Team leader :

Dr CHETIBI Loubna

c. Members of team 1 :

Researchers :

Dr. C. SEDRATI
Dr. M. BOUTEBDJA
Prof. S. ACHOUR

Doctorants

S. BOUDJEMA
H. BOUSSAFEL
A. ZEMIECHE

d. Objectives of team 01 :

- Manufacture of grapheme for reinforcement of metal, organic matrices,
- Development of nanomaterials for energy production.
- Development of energy storage processes.
- Improvement of the electrical and optical properties of nano-structured thin films.
- Manufacture of nanostructures for use as fuels.

a. Team 2 : Advanced Materials

b. Team Leader :

c. Dr A. Hayoune

d. Members of team 2 :

Researchers :

Dr A. Hayoune
Dr. M. Boufenghour
Dr. M. KHEBBAB
Prof. D. HAMANA

Doctorants :

Y. HAMIANE

M.BACHANI Mokded
I. TALBI

e. Objectives of team 2 :

- Elaboration of metal-based nanomaterials (steels and aluminum alloys) by different methods (mainly by severe plastic deformation).
- Development of new materials: ceramics, metal and organic matrix composites.
- Optimization of the physical and mechanical properties of metal alloys used in the Algerian industry (aluminum alloys and steels).
- Study of the phase transformations occurring in the different types of materials (metal alloys, composites and ceramics).

a. Team 3 : Mathematical Modeling and Simulation

b. Team leader :

Dr. Ould Lahoucine Khaled

c. Members of team 3 :

Researchers :

Dr. D. MEZHOUD Djâafar
Dr. D. GUERDOUH Dalila
Dr. M. AISSOUS

d. Objectives of team 03 :

- Description of the behavior of matter at the atomic and subatomic scale.
- Exploration of the geometric symmetries underlying the behavior of certain materials.
- Mathematical modeling of the Laser-Matter interaction for isotropic and anisotropic plasma media.
- Numerical modeling of atomic or subatomic phenomena.

a. Team 4 : Ceramic Technologies

b. Team leader :

Dr. BOUDCHICHA
Mohamed Rédha

c. Members of team 03 :

Researchers :

Dr. Z. BOUTAMINE
Dr. Y. BOUACHIBA

Doctorants :

A. SADJI
O. CHERIET

d. Objectives of team 03 :

- The development of new types of high-performance ceramics
 - Refractory, ferroelectric, piezoelectric ceramics, their elaboration as well as their applications.
 - The development of nanostructured ceramic materials and the impact on their performance.

o Research Projects PRFU :

- Study of phase transformations in conventional and nanometric materials - directed by Prof. Hamana Djamel
- Study of nanomaterials for energy production and storage - led by Dr. CHETIBI Lubna

o Objectives of the laboratory:

The Laboratory of Advanced Materials Technologies of the National Polytechnic School of Constantine is a public entity with a scientific and technological character. It brings together the research teachers of the Materials Engineering department of the said school. It is made up of four (04) multidisciplinary, reactive and comprehensive research teams. These research teams are responsible for developing the inherent research activities in the field of materials. Indeed, these activities will cover multidisciplinary fields: nanomaterials, advanced materials, phase transformations and ceramics. Indeed, the research themes envisaged will be conducted both experimentally and theoretically. They will be oriented indifferently to research, training and cooperation with the economic sector.



i. Technological platform "Development of Materials and Manufacturing"

Created by interministerial decree of August 31, 2019 creating a joint research service within the National Polytechnic School of Constantine "Malek Bennabi", it consists of seven (7) technical platforms installed in seven (7) equipped technological halls.



- In accordance with Article 4 of Executive Decree n ° 12-293 of July 21, 2012, this technological platform is the framework for manufacturing prototypes, experimentation, demonstration, applied research, technical assistance and consulting for the benefit of economic

companies, and contributes to the practical training of students, improvement and retraining. The equipment of this platform will have as an advantage :

- to provide support for innovation and the modernization of the economic and industrial sectors through service and technical services, training and development as well as research,
- to carry out expert assessments, analyses and others for the benefit of the socio-economic sector,
- to find solutions to the problems that arise in the socio-economic sector
- to manufacture research and teaching equipment for laboratories and training institutions thanks to the technical means of the various platforms, taking care to rely on and develop reverse engineering well,
- to repair and restart any broken device or to transform it into an additional assembly for a device manufactured on site,
- to contribute to the technological training of the students of the Polytechnic School of Constantine in order to facilitate their integration within companies, to allow them to realize their own start-ups and to integrate research centers as a design and research engineer.



Missions and organization of the service in technical sections

1-Development Section - Development of various materials (metals, ceramics, composites, polymers, nanomaterials and innovative materials) for industrial and research use (for the practical training of students), using the induction furnace and their

treatment using heat treatment furnaces under a controlled atmosphere of nitrogen gas (by the nitrogen generator) to acquire specific properties required by the industrial sector or researchers, the Grinder, the Sifter and the Crusher, as well as all the equipment necessary for the development of composites and polymers (Ovens, epoxy and polyester injection machines, pyrolysis ovens, refrigerator, freezer, viscous products mixer and vacuum pumps...).

Cette section est chargée de :

This section is in charge of :

- **Develop classic materials**
- **Develop new materials**
- **Developing nanomaterials**

List of materials in this section :

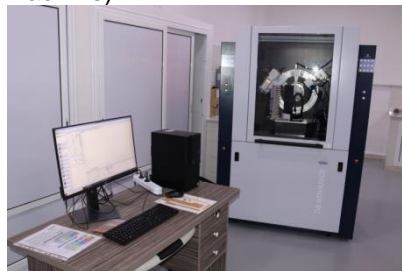
1. heat treatment furnaces 1400°C and 1500°C
2. Induction oven 1800°C
4. Set of heat treatment furnaces (1500°C oven and 1400°C vacuum sintering oven)
5. Nitrogen generator (output pressure greater than 5 bar)
6. Crusher, Sifter, Crusher,
7. Curing ovens (Autoclaves)
8. Two-component EPOXY injection machines
9. Polyester injection machines
10. Laboratory pyrolysis oven under natural gas
11. Laboratory refrigerator volume 500L
12. Large volume chest-shaped freezer
13. Mixer for viscous product



2- Manufacturing Section:

for industrial and research use (for the practical training of students), using 3D printers for ceramics, with high temperature sintering furnace and debinding, 3D thermoplastic and 3D resins

with a Scanner, structured light for reverse engineering and quality control, the water jet cutting machine, the 3-axis CNC machining machine, the 200 T motorized hydraulic press, the 5-axis machining center assisted by ultrasound, as well as all the equipment necessary for the manufacture of composite and polymer parts (heating press, table vacuum heating, vacuum heating table, filament winding machine, scales, compression pot for RTM, vacuum gauge, resin retention tanks, cutting machines, various resins, various fabrics, cores for sandwich structure and notching machine).



This section will also make it possible to manufacture composites used for remarkable innovations, in particular in the fields of aeronautics, the automobile, in various structures, various assemblies, parts, in transport and building. They are lighter, more efficient, more efficient and offer greater freedom of form. This section will be supported and completed by three mechanical and electronic repair and glass blowing workshops (to be acquired incessantly).

This section is in charge of:

- **manufacture composites**
- **manufacture composite parts**
- **manufacture composite prototypes**

List of materials in this section :

1. *High temperature sintering furnace with debinding furnace*
2. *3D printer for ceramics and debinding furnace*
3. *Resin 3D printer and structured light 3D scanner*

for reverse engineering and quality control

4. *Waterjet cutting machine*
5. *3 Axis CNC machining machine (turning and milling)*
6. *Motorized hydraulic press 200 tons*
7. *3D printer for thermoplastics with scanner*
8. *5-axis machining center (ultrasonic assisted optional)*
9. *Vacuum pump*
10. *Heating press with pneumatic closure+ compression port for RTM*
11. *Vacuum heating table*
12. *Filament winding machine*
13. *Vacuum Gauge*
14. *Cutting machine*
15. *Resin retention tanks*
16. *3D printer for composites*
17. *Wardrobe*
18. *Tray scales*
19. *High precision laboratory scales*
20. *Preparation laboratory with polishers, micro chainsaw, chemical hood...etc*
21. *Cutting machine (composite, fabric, core)*
22. *A laboratory diamond disc table chainsaw*
23. *CNC composite fabric cutting machine*



3- Analysis, Evaluation and Maintenance section:

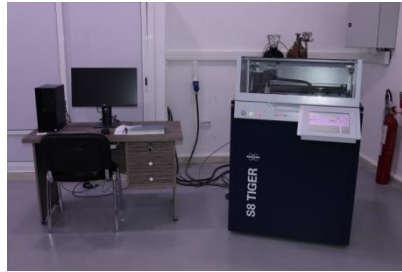
It will be used to study and determine the properties of the materials developed and treated as well as tests on the manufactured parts. This section is very useful because it will make it possible to understand and verify the properties obtained, following the various treatments for a better practical application and to evaluate and control the materials used in the manufacture of the various parts and devices; it will take care of all the necessary analyzes and

tests, required by the other sections. For this, it will have the following equipment: a differential dilatometer, a microdurometer, a MET/FEG, an AFM, a rheometer, a BET, a density meter, a SEM/FEG, a Profilometer, a 3D Roughness meter, a Radio-Frequency luminescent discharge Spectrometer (GDOES), an X-ray Diffractometer, a DSC/ATD/ATG 1400°C, a bi axial fatigue machine, an X-ray Fluorescence, an Infrared Spectrometer FTIR -ATR, a Potentiostat-Galvanostat with Impedance Meter (to be acquired incessantly), a glass blowing workshop (to be acquired incessantly), a mechanical preparation and repair workshop and an electronic preparation and repair workshop, a Raman and various polymer and composite analysis devices (TMA/DMA, Pulse analyzer, vibrophore, fatigue machine for polymers and composites, charpy sheep, and Drop Weight Impact Testers).



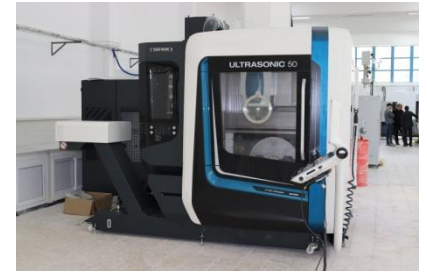
This section is in charge of :

- study and determine the properties of the materials developed and treated
- Make tests on the manufactured parts to ensure a better practical application
- evaluate and control the materials used in the manufacture of various parts and devices
- to ensure the maintenance and repair of the devices



List of materials in this section:

1. Microdurometer
2. Transmission Electron Microscope (MET/FEG)
3. Differential dilatometer 1400°C
4. Atomic Force Microscope (AFM)
5. BET and Densimeter
6. SEM/FEG to evaluate and control the materials used in the manufacture
7. Rheometer
8. 3D Profilometer Roughness Meter
9. GDOES Radio Frequency luminescent discharge Spectrometer
10. X-ray diffractometer for the evaluation of manufacturing materials
11. DSC/ATD/ATG 1400°C
12. Bi axial fatigue machine
13. Workshop of preparation and mechanical repair
14. Scientific glassblowing workshop (to be acquired incessantly),
15. Electronic preparation and repair workshop
16. X-ray Fluorescence
17. FTIR-ATR Infrared Spectrometer
18. Potentiostat- Galvanostat with impedance meter (to be acquired incessantly),
19. Raman (to be acquired incessantly),



and various devices for analyzing polymers and composites (TMA/DMA, Pulsenvibrophore analyzer, fatigue machine for polymers and composites, charpy sheep and drop weight impact testers).



II. The incubator of the ENPCConstantine

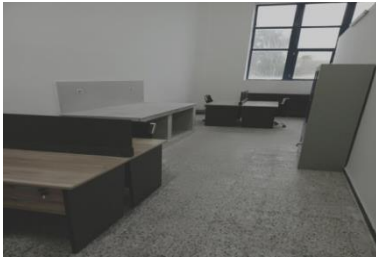
According to the Interministerial Decree of 20 Safar 1442 corresponding to October 8, 2020, a joint research service has been created, in the form of an incubator within the National Polytechnic School of Constantine (ENPC).



o Mode of organization and operation of the ENPC incubator : :

a. The partner institutions of the ENPC incubator sont :

- National Polytechnic School of Constantine ENPC
- National agency for the evaluation of the results of research and technological development ANVREDET
- Socio-economic partners. (Sonatrach, ...)



b. Organization of the ENPC incubator :

- According to article 3 of the previously mentioned interministerial decree, The incubator, comprises two (2) sections

• The management engineering section : Composed of a coordination council :

- The director of the school Prof. Djamel Hamana
- Head of the incubator Dr. Fares Rebahi
- Scientific personality Prof. Bouzid Djallel
- Representative of the socio-economic sector Mr Hadjkhelouf Ahmed, project manager at SONATRACH Skikda

and an organization and information cell:

Head of the incubator Dr. Fares RebahiDr.

- Hamza Semmari
- Dr Benmoussa Mohamed Mahdi
- Representative of ANVREDET, Mr Fraga, Mme Mahi,...
- Representative of the socio-economic sector Mr Hadjkhelouf

The management engineering section is in charge of :

- ❖ Ability to host and support innovative projects related to research to research
- ❖ In order to help the project leader to formalize his idea ;
- ❖ In order to select and validate the long-term project idea
- ❖ In order to offer the project leader support in terms of training, advice, financing and hosting

them until the creation of a business

- ❖ In order to follow the evolution of the companies created by the incubator.

• The section for the safety and maintenance of scientific equipment

Composed of the staff of the ENP Constantine, is in charge of :

- ❖ the maintenance of the scientific equipment made available to the incubator ;
- ❖ In order to ensure the safety of the site and scientific equipment.



c. The ENPC's incubator activities :

A competition of the best innovative projects, The ID Tour, was organized by ANVREDET in partnership with the ENPC incubator; five (5) projects were selected and accepted and currently are accompanied by the ENP incubator of Constantine under the direction of ANVREDET.



d. Perspectives

- Établir un plan d'action annuel avec nos partenaires l'ANVREDET et le secteur socio-économique
- Establish an annual action plan with our partners ANVREDET and the socio-economic sector
- Seek and sign agreements with other socio-economic partners
- Installation of a FABLAB at the level of the ENPC

incubator with the help of the DGRSDT



○ In the field of external relations:

On an international scale, the School has signed cooperation agreements with institutions from different countries such as France, Italy and Germany. Currently, cooperation is largely carried out with France, within the framework of program agreements, or through simple contacts between laboratories, allowing the realization of certain research works requiring an environment both human and material, not available at School.

On a national scale, the School has signed cooperation agreements with institutions from different economic, industrial and military sectors. The objective is to lead to the creation of a network of companies and users, important enough to make effective the management of internships for engineering students, so that they are seriously introduced into the training and taken into consideration in the evaluation and educational progress.

The ENPC is also part of the Center of Excellence in Biotechnology.

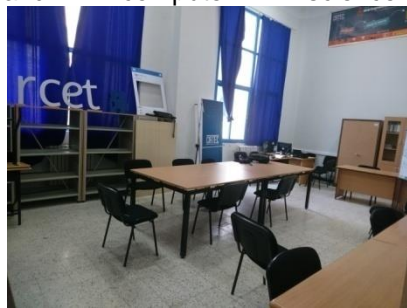
It is in this context that our graduate school aims to train high-level engineers who can easily integrate the productive industrial sector to contribute to its development and its flourishing; as it will spare no effort to help these future engineers to concretize their innovative works and their possible patents by setting up micro-enterprises that they will manage themselves.

The ENPC intends to establish itself as a pole of excellence in the fold of higher education and scientific research in Algeria. Its creation reflects on the one hand,

the determination of the public authorities to make the city of Ibn Badis a leading pole for science and research, and expresses on the other hand, Algeria's desire to train men capable of meeting the challenge of development and meeting the requirements born of the lightning speed of technological developments.

Extra-Curricular Life: Club

The CIRTE Cirta Engineering Club is a scientific, cultural and sports club of the ENPC (The National Poly-Technical School of Constantine) which is interested in novelties in the field of automation, mechanics, materials sciences, robotics, electronics and computer science.



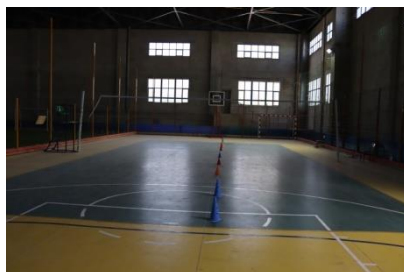
CIRTEC Club of the ENPC

In addition, it has a weight room and training for combat sports (judo, karate,...) and two covered fields, one for football with an artificial tartan of the latest generation and the other for handball, volleyball and basketball as well as two ball game tracks.

Two petanque courts are also available to students, teachers and ATS staff.



soccer field



Volleyball, basketball and handball courts



The Gym



changing rooms and showers in the gym

This by organizing various scientific and cultural events, workshops and startups throughout the academic year. The main goal of the club is to develop the student community and give all students the opportunity to present their ideas, enhance their scientific and professional projects as well as acquire new skills and experiences.

The ENPC has two relaxation areas, one reserved for students and the second for teachers and ATS staff



Students Cafeteria

The latter is equipped with a billiard table, two table football and a ping-pong table, in addition to a television and a music room with all classical and modern instruments and a professional sound system.



Teacher's and administrative staff 's Cafeteria

Educational Assessment :

Since the opening of the school in September 2014 we have recorded the release of five (05) promos of :

2017: (100) engineers
2018: (75) engineers
2019: (93) engineers
2020: (97) engineers
2021: (86) engineers
that is a total of 451

Scientific assesement :

Since the opening of the school in September 2014, we have recorded -

- the defense of 06 State Doctorates

In addition, the teachers of the ENPC have to their credit the publication of 586 scientific articles in internationally renowned scientific journals, 151 of which have been published since the opening of the School.

Malek BENNABI



Born in 1905 in Constantine, from a traditionalist family, Malek BENNABI made his first entrance to the Koranic school of Tebessa where his parents lived. These studies, he had to pay while his parents were having difficulty finding the money necessary for the schooling of their child. Thus and after four years spent within the said school,

Malek joined the French school. He remained there until 1918, during which year he completed the preparatory studies opening him access to the secondary cycle. His brilliant results make him win a scholarship to continue his studies in Constantine where he resided with his uncle who gave him some music lessons. That's how he got the privilege of being trained by a man from whom he learned a lot, the sheikh

Abdelhamid BEN BADIS. He therefore studied the Arabic language at the Great Mosque. Returning to Tébessa where he attended a club put under the direction of Sheikh Larbi TÉBESSI, he worked as an office agent at the city Court before being transferred to Aflou where he became acquainted, for the first time, with the newspaper Chihab directed by Abdelhamid Ben Badis whom he will also know for the first time in 1928 in Constantine. Thus, and at the request of the latter, Malek is assigned to Chelghoum Ugly from where he resigned some time later from his position after his falling out with the clerk secretary of the court. Thus, in 1929, his father suggested that he go to France to continue his studies, which he joined in September 1930 and opted for the Institute of Oriental Languages. His

presence in Paris allowed him to get in touch with the Association of Young Christians in Paris. He was unable to access the Institute of Oriental Languages because access for an Algerian Muslim does not depend on scientific criteria, but on the political norms in place. That is why he opted for studies in electricity and obtained the diploma of engineer at the Special School of Mechanics and Electricity.

In 1931, Malek BENNABI married a French woman who embraced Islam and then took the first name of "Khedidja". In 1932, he received Mahatma Gandhi who visited Paris where he led a conference organized by the Association of Young Christians of Paris.

In 1936, accompanied by some friends, he met the Algerian delegation that had gone to Paris to demand, from the French authorities, the reforms proposed by the Muslim Congress. The delegation included in particular Sheikh Abdelhamid Ben Badis and Sheikh Bashir El-Ibrahimi. In 1938-39, BENNABI founded in Marseille a school for adult illiterates among Algerian workers in France. The French authorities summoned him and forbade him to continue teaching at this institution for reasons of "incompetence".

In 1946, Malek BENNABI published in Paris "The Koranic Phenomenon", which he wanted a scientific proof of the divine character of the Koran and a refutation of theses attributing it to a human work. He also published a novel "Lebeik" (1947), and studies such as "The conditions of the renaissance" (1948), "Orientation of the Muslim world" (1954), and "The concept of Afro-asiatis". on the occasion of the Bandoeng conference.

It should be noted that, apart from the novel aroused, Malek BENNABI had published his works under the title "Problems of civilization" because he considered that the various problems of the Muslim world refer to this context.

In 1956, he went to Cairo, completely cutting off with

France, which he will never see again. The only link that linked him to her was the correspondence he maintained with his French wife who had refused to accompany him to Cairo. He contacted the president. Egyptian Gamal Abdel Nasser and benefited from a monthly salary from the Egyptian government, which allowed him to devote himself to intellectual activity. Malek BENNABI learns, during his stay in Cairo, the Arabic language in which he began to write and give lectures. He visited Syria and Lebanon several times to give lectures there. The National Liberation Front entrusted him with several missions outside Egypt. He was also in Cairo, one of the advisers to the Organization of the Islamic Conference (OIC).

After contacting several friends and students, he proceeded to translate his works into Arabic, a language that he later adopted as his working language.

In 1963 Malek BENNABI returned to Algeria where he was appointed Director of Higher Education. He resigned in 1967 to devote himself to intellectual work, reform and the organization of intellectual meetings that later became seminars of Islamic Thought that Algeria organizes every year. He lived the rest of his days in Algeria where he died on October 31, 1973.

He was buried in Constantine.