UNIVERSITY of NICOSIA

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VRAA 33-LT-2023
Ref. Num.: 07.14.336.001.001

December 28, 2023

Professor Mary Ioannidou-Koutselini
President of the Board of the
Cyprus Agency of Quality Assurance and
Accreditation in Higher Education
Nicosia

Dear Prof Koutselini,

Subject: Postponement of Decision for Re-Accreditation of the Mechanical Engineering (4 years, 240 ECTS, Bachelor of Science)

We hereby indicate all our actions relevant to the requests submitted by the President of the Cyprus Agency of Quality Assurance and Accreditation in Higher Education (CYQAA) in the letter sent to us on August 28, 2023, Ref. No. 07.14.336.001.001, in relation to the pending decision for the accreditation of BSc in Mechanical Engineering.

1. Ενίσχυση προσωπικού στη μηχανολογία με προσωπικό πλήρους απασχόλησης με προκήρυξη των θέσεων ΔΕΠ και όχι με μετατροπή υφιστάμενου μη μόνιμου προσωπικού σε μόνιμο

Actions taken by the Institution:

Following the approval by the University Council for the two new faculty positions in Mechanical Engineering the two positions were opened in the following areas:

A) Dynamics, Vibrations, Control Engineering and Robotics
B) Material Science and Engineering

In response to the announcement on UNIC's web-site and LinkedIn, nine (9) applications were received. The School Faculty Selection Committee (SFSC) for the Mechanical Engineering program, recommended five (5) applicants for an interview/presentation.

During the presentation/interview, all five (5) applicants were asked to present a mock 45-minutes class from one of the courses in the Mechanical Engineering program, followed by a 45-minutes presentation of their research interests, research achievements (including grants and publications) and research plans. The presenters

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were asked to allow some time for questions and answers for each of the two presentations.

The SFSC had a face-to-face meeting in order to take final decisions. Following a long debate where the members of the Committee had the opportunity to discuss the pros and cons of each short-listed applicant, the SFSC decided to propose the following applicants for the positions:

A) Harry Iordanou

Dr Iordanou holds a BSc in Mechanical Engineering (1989-1992) from the Technical University of Nova Scotia, an MSc in Engineering (1992-1994) from Queen's University, Kingston, and a PhD in Mechanical Engineering (1994-1998), Queen's University, Kingston. He has over 25 years of experience in the Aerospace industry (teaching and training, research, management) in areas such as spacecraft manufacturing monitoring, platform and satellite systems, space robotics, launch and operations program management, space operations and personnel management. Despite the confidential nature of his work, he has published 2 journal papers and 13 conference presentations (some of them with proceedings), beyond over 50 classified reports.

B) Marios Constantinou

Dr Constantinou holds a BSc in Materials Science and Engineering (2007) and an MSc in Chemistry and Materials Technology (2009) from the University of Ioannina and a PhD in Material Science and Engineering (2018) from the Cyprus University of Technology. He has a 4.5 years Post-Doctoral experience at Cyprus University of Technology. His research is in Nanostructured Amorphous Carbon Metal Films for Protective and Solid Lubricant Applications. He has published 19 journal articles and has 19 presentations (oral, posters, etc.) at conferences. He worked on 6 funded research projects as a student and as a post-doctoral research associate. He has the capability of writing research proposals for funding, especially on experimental work. He also spent 2 years in industry as quality control/health and safety manager.

The contracts with sensitive info excluded are attached in Annex 1 (Dr Harry Iordanou) and Annex 2 (Dr Marios Constantinou).

2. Επιμόρφωση προσωπικού μέσω προγραμμάτων κινητικότητας

Actions Taken by the Institution:

It should be noted that our program is already receiving a number of students from other European partners. Furthermore, now that the number of students in the program has increased (21, 19, 27, and 30 new students, respectively, joined the program in the last four (4) academic years) we will further encourage our students to apply for mobility

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in the EU. This way we will have two-way exchanges and our students will benefit from the Erasmus+ experience both in terms of study mobilities and in terms of traineeships.

It should be noted that UNIC already has Erasmus+ agreements for Mechanical Engineering exchanges (faculty and students) with 10 universities (the detailed list is attached as Annex 3).

There is also a high potential for new ERASMUS+ agreements between UNIC and other universities with European Space Agency (ESA) member states within ESA Plan for European Cooperating States (PECS). ESA has extended invitations to faculty members from Mechanical Engineering to attend the first PECS / Associate / New Member States Tertiary Education Conference that will take place from May 6-8, 2024, at ESA's premises in Madrid, Spain. The PECS / Associate /New Member States Tertiary Education Conference is organized by the Capability and Country Support Division in the ESA Directorate of Commercialization, Industry and Procurement with the intention to foster international cooperation and partnerships between universities in PECS / Associate and New Member States and also with experienced tertiary educators in older member states in order to optimally develop the next generation of workforce for the space industry. The invitees will be exposed to tertiary education for space by hearing from those who have recently developed or plan to develop space related courses for their BSc and MSc students, hear from experienced space experts on their views, and network to foster collaboration. Sessions will be held covering education for the exploitation of space data and development of downstream applications, spacecraft and ground segment engineering and education for space life sciences.

Regarding the faculty mobility, short term planning includes the following:

- Professor Dimitris Drikakis (DD) will visit the University of Crete and the University of Thessaly in Greece during the Spring'24 semester. Both universities carry out complementary teaching and research activities to the UNIC's Engineering Department. DD has collaborated with researchers and faculty at both universities in machine learning and fluid dynamics with applications relating to particles (including aerosols/sprays), shock-boundary-layer interaction, and acoustic fatigue. The collaborations have resulted in several joint journal publications. The visits aim to strengthen the above relationships, enable DD to understand better various research directions carried out by the respective teams in Crete and Thessaly, and facilitate collaboration regarding research proposals. Furthermore, DD will have the opportunity to discuss with faculty in other disciplines, thus expanding the research portfolio in areas such as environmental sciences/engineering and biomedical engineering.

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- There are currently 2 contracts in place with ESA that are intended to develop space education courses for the Department of Engineering at UNIC, both targeting mechanical engineering students and presenting the principles of space environment, celestial mechanics, spacecraft dynamics, subsystems and mission design. Dr Harry Iordanou is coordinating the activities. Another key objective of this activity is to encourage collaboration with the space industry and academia as well as establish agreements for pursuing common research interests and promoting space education. Potential routes for cooperation and information exchange for earth observation projects and spacecraft technologies as well as student training sessions are already being pursued with several European universities. Internships in the space industry are also planned through these contracts. The potential for establishing similar agreements with universities that UNIC has ERASMUS+ agreements with, can additionally be pursued.

- Dr Harry Iordanou is planning a visit to the University of Applied Sciences Stralsund, a university in Europe with which UNIC has an ERASMUS+ agreement (D STRALSU01). One of our visiting ERASMUS mobility students this Fall 2023 semester, Eric Schmeisser, is a student at the University of Applied Sciences Stralsund. He is heavily involved in the Student Formula Team at his university and had discussions with Dr Iordanou regarding a visit to the School of Mechanical Engineering and collaboration with the laboratory engineer and founder of the Formula Student Team Baltic Racing. The tentative date for the visit is Monday, 05/02/2024 through Saturday, 10/02/2024.

3. Βελτίωση στις εργαστηριακές υποδομές, σύμφωνα με τις παρατηρήσεις των εμπειρογνωμόνων

Significantly enhance laboratories and other experimental facilities available to the students.

Actions Taken by the Institution:

Since launching the program back in 2017, we have continuously and steadily enriched our laboratory facilities and equipment. We will continue to do so by including in our annual budget money for more specialized equipment, which will further enhance our labs and other facilities and will enable both students and faculty to carry out research beyond covering the needs for experimentation as part of courses. We have recently received approval by the Council for the CAPEX budget for the 2023-24 fiscal year in which over €60K was requested in order to acquire new equipment/apparatus for the Mechanical Engineering Lab.

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More specifically, the following equipment will be added to the Departments' lab infrastructure:

- 130W Rotary tool (Dremel), a 3D printer accessory to support Final Year Projects;
- Signal Generator and Amplifier, to support MENG340 lab exercises (Vibrations);
- Terrestrial 3D Laser Scanner (camera) with 128 GB SSD;
- Ansys Software Academic Multiphysics Solution;
- Frequency Generator, to support MENG340 lab exercises (Vibrations);
- Rectilinear Plant 1.5 to 7 Hz, to support MENG252 lab exercises (System Dynamics) and MENG342 lab exercises (Control of Dynamic Systems);
- ROBODK Robot Simulator (Software), to support MENG440 lab exercises (Mechatronics and Robotics).

The updated table in Annex 4 shows how the courses, which include laboratory components, are served with our current physical spaces and existing/soon to be acquired laboratory equipment. The existing Lab infrastructure that specifically supports the BSc in Mechanical Engineering Program's core courses includes:

- **Fluid Mechanics Laboratory (at the Mechanical Engineering Laboratory)**

The Fluid Mechanics Lab includes all equipment needed to impart practical knowledge to the students, which, in addition to the theoretical part, is essential in Mechanical Engineering. Existing lab equipment include the Venturi Meter, the Pipework Energy Losses apparatus, and the Pressure Measurement apparatus (Figures 1 and 2).

Figure 1: Pipework Energy Losses apparatus (left) and Venturi Meter fits on Hydraulic Bench (right). Both experimental apparatus were purchased from TecQuipment Ltd Company.

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Figure 2: Pressure Measurement apparatus (right) and Calibration of a Pressure Gauge apparatus (left). The pressure measurement apparatus was purchased from TecQuipment Ltd.

- **Strength of Materials Laboratory**

Mechanical properties are magnitudes that reflect the response of materials under imposed load. In general, Mechanical Engineers are increasingly interested in the mechanical properties of materials or regulating the mechanical response especially when materials are intended to be used in structures as integral parts of their load-bearing capacity. The Laboratory hosts the following:

- Compression Testing Machine for (up to 3000kN)
- Shear and bending Test apparatus (up to 250kN)
- Assembly for Flexural testing of beams
- Split Cylinder Platen Assembly
- Universal Tensile Testing Machine - Max load 100kN
- Data acquisition system with strain gauges, displacement gauges and loading gauges.

The Strength of Materials laboratory is housed in the Research & Technology Building, Room B42. A description of the capabilities of the existing equipment used in the Strength of Materials lab course is given below:

Tensile Testing

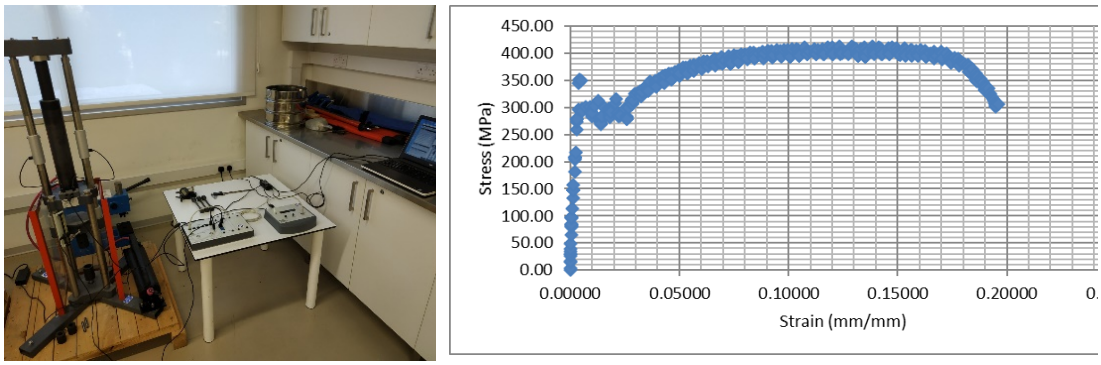

Figure 3: The experimental set up of the Tensile Testing purchased from TecQuipment Ltd Company (left) and an experimental stress-strain curve acquired from a tensile testing on a steel material (right).

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Strain Hardening

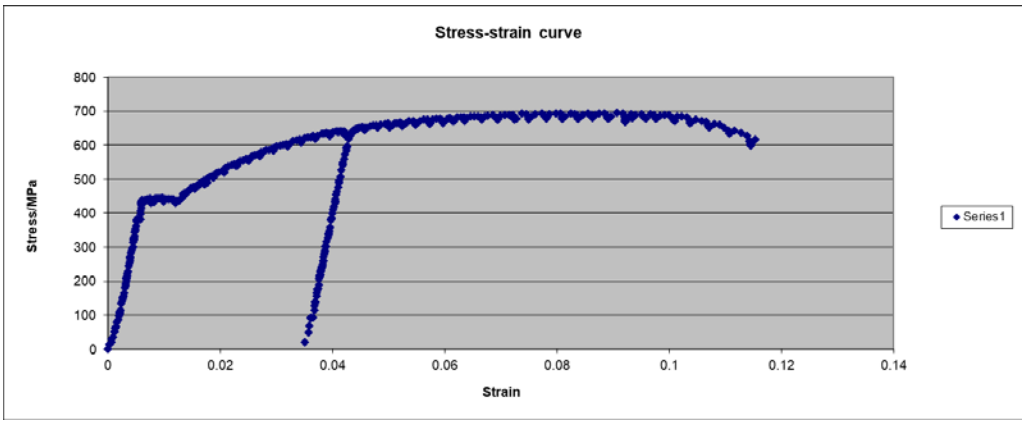

Figure 4: An experimental stress-strain curve for strain hardening the tested steel material.

Virtual Labs have been developed for **Creep phenomenon** and **Crack size role.**

- **Automotive Technology Laboratory**

The Automotive Technology Laboratory covers an area of 180 $m^{2,}$ while no more than 15 students are permitted to use the laboratory at any time. The laboratory is separated into the following main sections:

Lecture/Technology room (and simulators area)

The lecture room is used for all modules that combine theory with laboratory/workshop. This way, it is convenient to shift between the laboratory and the classroom when necessary. Typically, during a module that combines laboratory work, the students are divided into two groups (e.g. six students per group). If, for example, it is a two-hour module, the groups switch places after two hours.

The technology room is utilised by the students to be taught on the use of specific automotive software, listed below:

- BTMS Garage software system
- Autodata Workshop
- HaynesPro WorkshopData Car Edition

Finally, specific simulator sessions on engine ignition systems and vehicle sensors are being held in the technology room. These simulators need computers to run their software.

Vehicle lifting area (first car location)

This is the section where a two-post hydraulic jack is located, so that vehicles up to 3.2 Tons can be lifted. Students use this area to work on heavy-duty jobs, under the supervision of a qualified lecturer.

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Vehicle Service Area (second car location)

In the general service area, there is room for a second vehicle. The students have the opportunity to use portable hydraulic lifters in combination with safety stands to work on the vehicle and go under it. The general service area is used for all kinds of lightweight operations. Commonly subjects concerning vehicle electronics use multimeters, diagnostic units, and oscilloscopes use the general service area. Additionally, classes concerning vehicle air conditioning use the general service area.

Engine Management Area

In the engine area, a set of four engines are located on stands. During their first year in the University, the students are assigned to specific groups and familiarise themselves with the engines and their main components by completely disassembling and assembling them.

Spare parts storage shelves area

Heavy-duty shelves are being utilised to store the majority of spare parts being held in the laboratory. The shelves have space for bulky and heavy components that could not be stored anywhere else.

Warehouse

The warehouse is utilised to store all the special equipment, such as diagnostic units, simulators, and oscilloscopes. Additionally, consumables such as protective gloves, vehicle liquids, and spare parts are stored in the warehouse. Finally, equipment that is not used on a day-to-day basis is also kept.

Automotive supervisor office

The entire laboratory can be observed from the automotive supervisor's office. It is utilised by lecturers to organise the classes and laboratories/workshops whilst at the same time observe every job that runs in the laboratory.

One can find the following components/equipment in the Automotive Technology Laboratory:

Main components/ equipment		
Type of Equipment	**Quantity**	**Description of equipment**
2-POLE LIFT JACK	1	2-POLE LIFT JACK 3.2T FOR MAIN GARAGE ARE
FACCOM 1/2 TITANIUM IMPACT WRENCH	1	FACCOM 1/2 TITANIUM IMPACT WRENCH
TROLLEY & TOOLS SET (173 PCS)	4	TROLLEY & TOOLS SET (173 PCS)
OIL DRAINER	1	OIL DRAINER 80LTRS
ENGINE STAND 1500KG	6	ENGINE STAND 1500KG

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PISTON RING COMPRESSOR	5	PISTON RING COMPRESSOR
METRIC FEELING GAUGES	2	METRIC FEELING GAUGES
VERNIER CALIPERS	4	PARALLAX FREE BEVEL VERNIER CALIPERS
HYDRAULIC JACK 1.5TON	1	HYDRAULIC JACK 1.5TON
MAZZOLA HYDRAULIC TRANSMISSION JACK 250 KG	1	MAZZOLA HYDRAULIC TRANSMISSION JACK 250 KG
MAZZOLA MANUAL MOBILE HYDRAULIC CYLINDER PRESS 20TON - W20	1	MAZZOLA MANUAL MOBILE HYDRAULIC CYLINDER PRESS 20TON - W20
3/8"DR CW/CCW ADJUSTABLE TORQUE WRENCH 19-110NM	1	3/8"DR CW/CCW ADJUSTABLE TORQUE WRENCH 19-110NM
1/2" DR.ELECTRONIC TORQUE ADAPTER 40-200NM	1	1/2" DR.ELECTRONIC TORQUE ADAPTER 40-200NM
HS0031 COMPRESSION TESTER FOR PETROL ENGINES	1	HS0031 COMPRESSION TESTER FOR PETROL ENGINES
HS1021 COMPRESSION TESTER FOR DIESEL ENGINES	1	HS1021 COMPRESSION TESTER FOR DIESEL ENGINES
ZECA INJECTOR TESTER	1	ZECA INJECTOR TESTER
ZECA RADIATOR TESTER ADAPTERS	1	ZECA RADIATOR TESTER ADAPTERS
OIL PAN 15 GALLONS OPEN TYPE	1	OIL PAN 15 GALLONS OPEN TYPE
MAZZOLA HYDRAULIC FOLDING CRANE 1000KG	1	MAZZOLA HYDRAULIC FOLDING CRANE 1000KG
JUMPOZECA - GAS EXTRACTOR 1PH-230VOLTS MOVABLE	1	JUMPOZECA - GAS EXTRACTOR 1PH-230VOLTS MOVABLE
AIR COMPRESSOR NS39 270LTRS 5.5HP	1	AIR COMPRESSOR NS39 270LTRS 5.5HP
ZECA YELLOW REEL M. 15+1 D.10MM	2	ZECA YELLOW REEL M. 15+1 D.10MM
PARTS WASHING TANK	1	PARTS WASHING TANK ELECTRICAL
IMPACT DEEP SOCKET 1/2"DR SET	1	IMPACT DEEP SOCKET 1/2"DR SET
44PCS 10MM HEX SIZE SHANK DRIVER BITS SET	1	44PCS 10MM HEX SIZE SHANK DRIVER BITS SET
CONDOR PULLEY	1	CONDOR PULLEY
MAGNETIC BASE 60KG 380MM	1	MAGNETIC BASE 60KG 380MM
UNIVERSAL DIAL TEST INDICATOR	1	UNIVERSAL DIAL TEST INDICATOR
TWO-JAW GEAR PULLEY 6"	1	TWO-JAW GEAR PULLEY 6"
PICOSCOPE OSCILLOSCOPE	1	AUTOMOTIVE DIAGNOSTIC INSTRUMENT
POWER PROBE ALBA	1	AUTOMOTIVE DIAGNOSTIC INSTRUMENT
BATTERY TESTER ALBA	1	BATTERY TESTER ALBA

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COMBINATION WRENCH 28 MM	4	COMBINATION WRENCH 28 MM
COMBINATION WRENCH 15 MM	4	COMBINATION WRENCH 15 MM
COMBINATION WRENCH 12 MM	4	COMBINATION WRENCH 12 MM
M196A GOSSEN METRAWATT METRALINE DMM16TRMS MULTIMETER	2	M196A GOSSEN METRAWATT METRALINE DMM16TRMS MULTIMETER
TWO-JAW GEAR PULLEY 4"	1	TWO-JAW GEAR PULLEY 4"
VERNIER GAUGE	2	VERNIER GAUGE
BORE GAUGE 30-620 MM	1	BORE GAUGE 30-620 MM
DIAL BORE GAUGE 20-200 MM	1	DIAL BORE GAUGE 20-200 MM
LAUNCH DIAGNOSTIC TOOL	1	DIAGNOSTIC TOOL FOR THE AUTO LAB
CAR JUMPER CABLES	1	WIRES FOR JUMP STARTING THE CARS
Multi Gas 8500 AIR-CONDITIONING MACHINE	1	EQUIPMENT FOR RECHARGING VEHICLE'S AIR CONDITIONING SYSTEM
CROSS SUPPORT BAR 300KG	1	EQUIPMENT FOR LIFTING THE CARS ENGINE
ENGINE JUMP STARTER	1	EQUIPMENT FOR JUMP STARTING THE VEHICLE VIA AC SOCKET POWER
WING PROTECTORS	2	FOR PROTECTING THE VEHICLES WINGS WHEN WORKING IN THE ENGINE COMPARTMENT
BRAKE BLEEDER BOTTLE 800ML	2	SPECIAL TOOLS FOR CARS BRAKE BLEEDING (REMOVING AIR FROM THE SYSTEM)
BRAKE CLEANER SPRAYER 1.5L	1	SPRAYER TO BE USED FOR BRAKE CLEANING CHEMICALS
WHEEL CHOCK SET OF TWO (TOTAL 4)	2	CHOCKS FOR AVOIDING VEHICLE ACCIDENTAL MOVEMENT

Some pictures of the Automotive Technology Laboratory are shown in Figure 5.

Figure 5: Views from the Automotive Technology Lab.

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- **Air Conditioning and Refrigeration Laboratory**

The students use a laboratory dedicated to refrigeration and air-conditioning to acquire the necessary practical skills needed by the industry. This laboratory occupies an area of approximately 90 m^2. No more than 12 students can use the laboratory at any time at any section. The laboratory is comprised of the following main sections:

- Six (6) A/C training rigs
- VRV centralised system
- Commercial refrigeration unit

A couple of pictures from this laboratory are shown in Figure 6.

Figure 6: Refrigeration units (left) and VRV units (right).

- **Mechanical Engineering Lab**

Thermodynamics and Heat Transfer is the branch of science that describes the basic laws and principles governing the transfer and transformation processes of energy along with the changes in properties of the substances affected by such processes. The rules are formulated from observations in nature. The science of thermodynamics also provides the relationships of the properties of substances for their use in determining the changes of properties in physical processes performed by the substances. The subject thermodynamics is of prime importance as a foundation pillar of all branches of engineering since technological processes, and their developments involve the transfer and transformation of energy.

Figures 7, 8, 9 and 10 show typical equipment available in the Mechanical Engineering Lab. All equipment was purchased from TecQuipment Ltd Company.

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Figure 7: Experimental equipment for the verification of Boyle's.

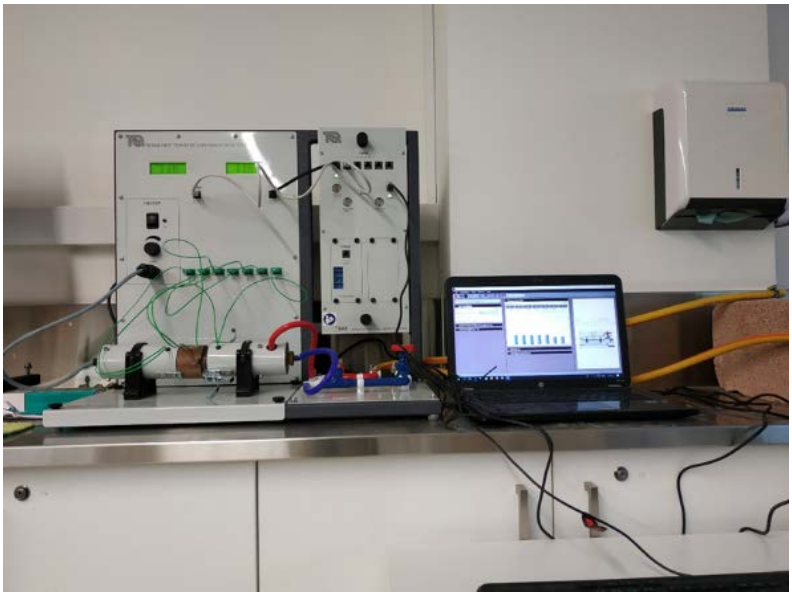

Figure 8: The Linear Heat Conduction experimental equipment.

Figure 9: The platinum resistance thermometer (PRT) equipment that was purchased from TecQuipment Ltd Company.

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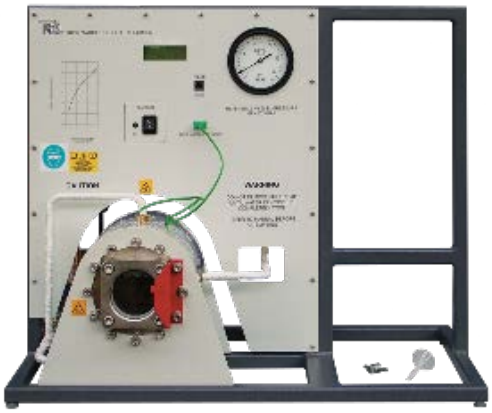

Figure 10: The Marcel boiler experiment equipment (boiling pressures-boiling temperatures) that was purchased from TecQuipment Ltd Company.

- **Advanced Manufacturing Laboratory (at the Mechanical Engineering Laboratory)**

Introduction to 3D printing technologies Nanotechnology, as applied in materials, relates to the ability of any engineers to build materials from scratch and then measure their structure-property traits; such artificial materials that have

Figure 11: Raise3D – Pro3 Series 3D printing equipment (directly driven by a PC or laptop to materialize SolidWorks designs).

- **Nano Educational Resources in Materials Science and Engineering Laboratory - Virtual Lab**

Nanotechnology, as applied in materials, relates to the ability of any engineers to build materials from scratch and then measure their structure-property traits; such artificial materials that have one or more structural entity with dimensions less than 100 nm in size are referred to as nanomaterials.

The Nano Educational Resources in Materials Science and Engineering laboratory is a new and very different experience compared to normal lab class. The nature of the lab course is such that it promotes nanotechnology experimental learning. The experiments prepared cover the following subjects:

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Atomic Force Microscopy

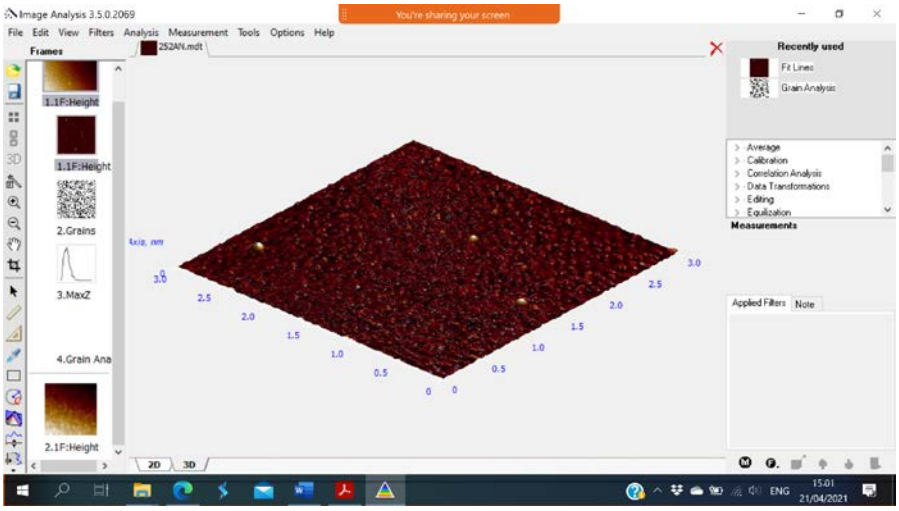

Figure 12: Screen shot from the Atomic Force Microscopy laboratory course conducted online for the students who are taking the Composite Materials course.

Nanoindentation

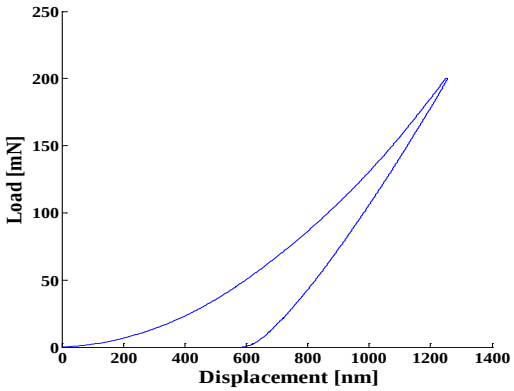

Figure 13. Indentation test data on fused silica sample using a Berkovich type indenter and a maximum load of 200mN (for the Composite Materials course).

More virtual labs with topics on X-ray Diffraction and Advanced Synthesis Techniques are currently being prepared.

- **Robotics and System Dynamics, Vibrations & Control Virtual laboratory**

Robotics is no longer an emerging engineering field; it has become an integral part of the manufacturing industry on a global scale. As an interdisciplinary research area interfacing computer science and engineering, Robotics involves the design, construction, operation and control of such intelligent machines. The Virtual Lab developed covered the following subjects:

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Vibrations

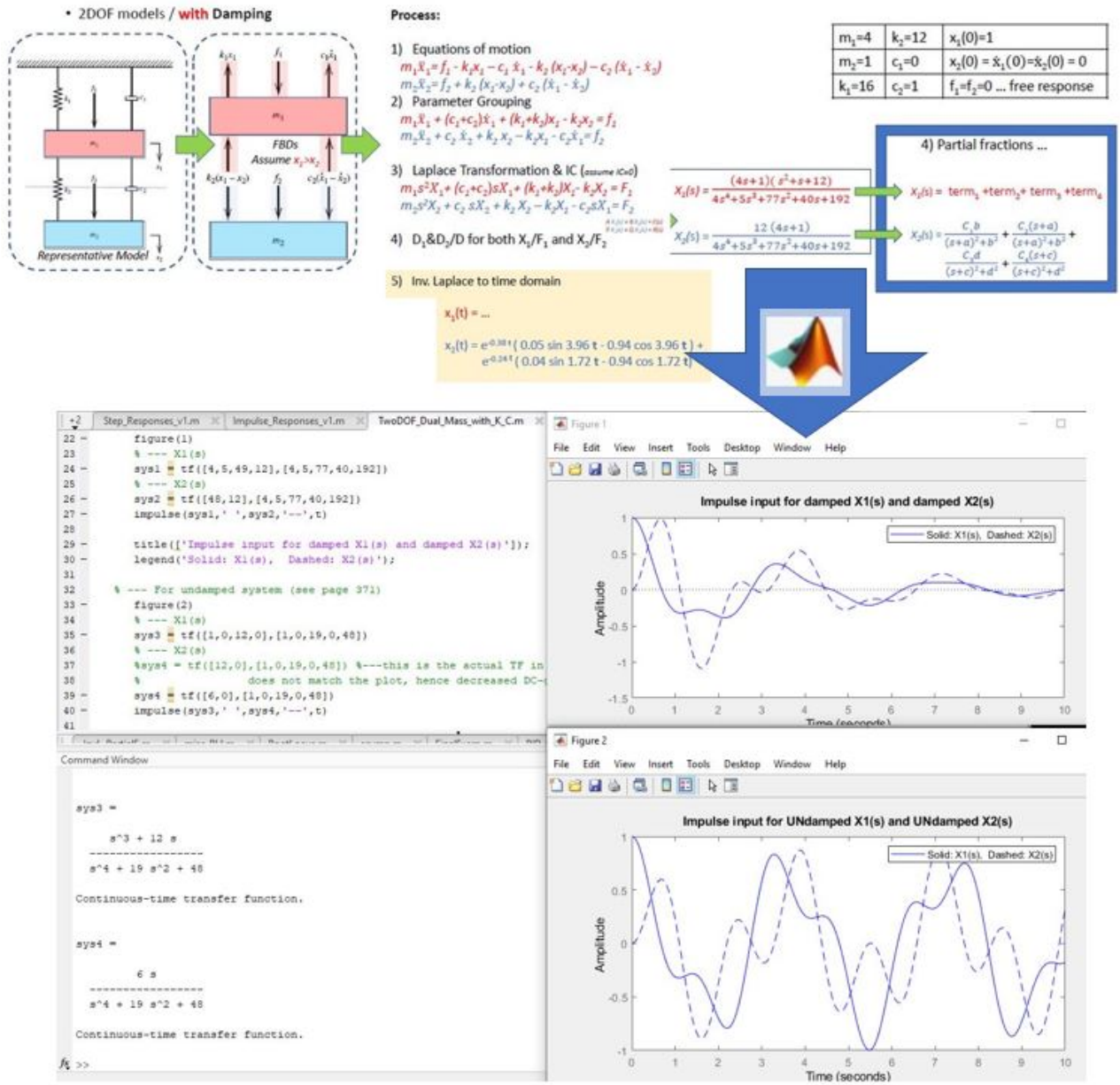

Figure 14. Principles of System Vibrations – (MATLAB application)

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Control Systems

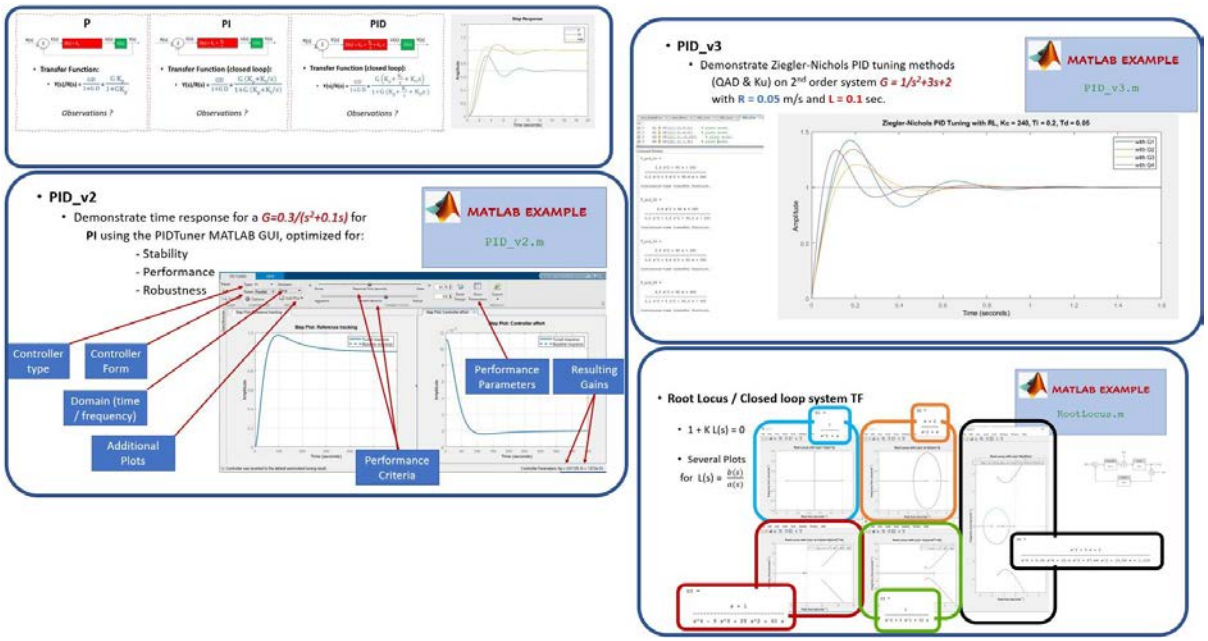

Figure 15. Principles of Control Systems (MATLAB application)

Robotics

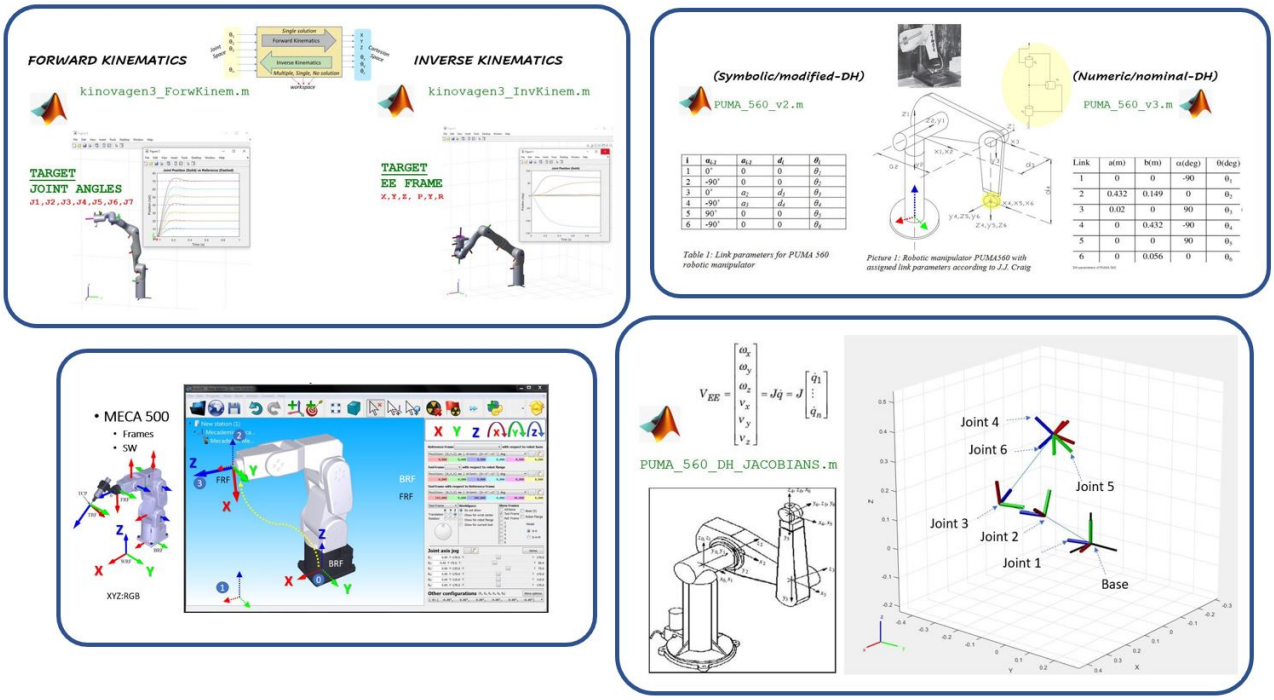

Figure 16. Robotics – virtual Lab

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CAD – SOLIDWORKS

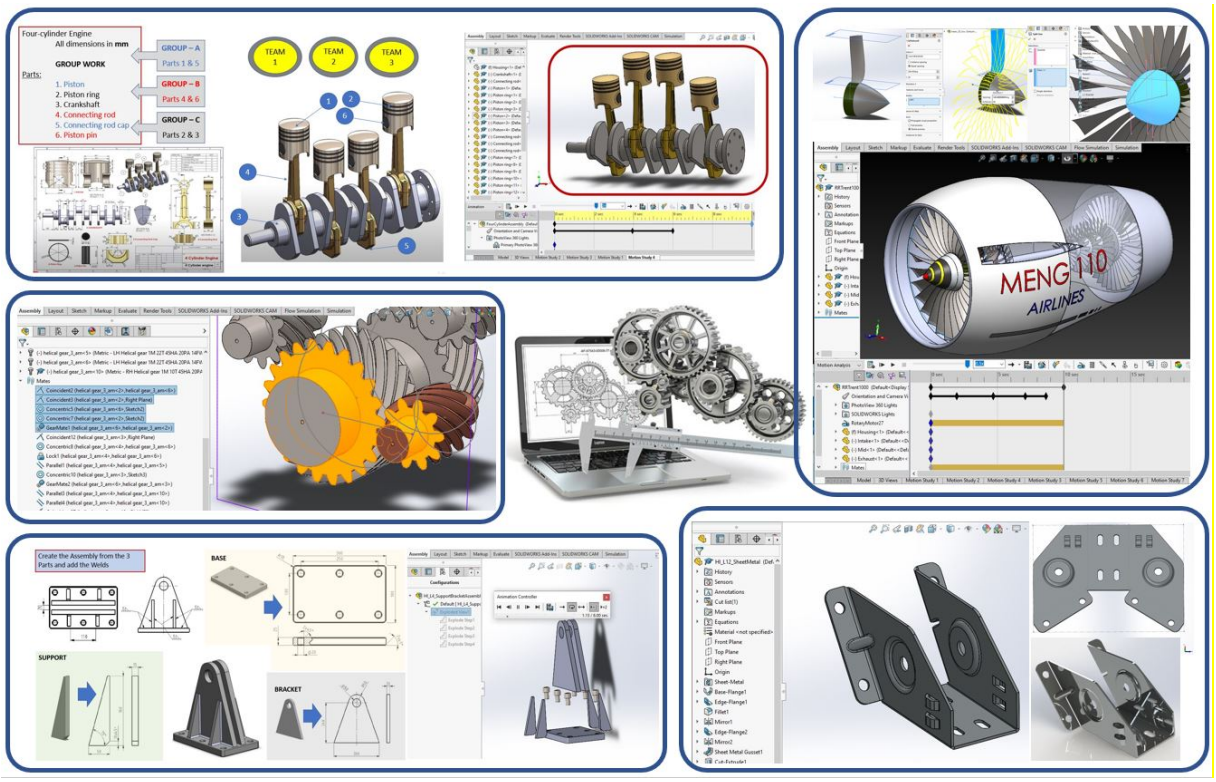

Figure 17. Computer-Aided Design – SOLIDWORKS

Elaborate, formalize, and enforce safety procedures for students in laboratories.

Actions Taken by the Institution:

A manual on Mechanical Engineering Laboratory Environmental, Health and Safety Issues has been prepared (Annex 5) and will be distributed to all students at the beginning of their studies. Furthermore, it will be available on our Departmental and Programmatic webpages. Students will be expected to read the manual and follow the safety instructions. In addition, where needed, labels have been placed on laboratory equipment.

4. Να μην ζητείται από τους/τις φοιτητές/ριες καταβολή τελών για χρήση εργαστηρίου, όταν η εργασία απαιτείται από το πρόγραμμα

Actions Taken by the Institution:

We are not sure as to why this recommendation was included in CYQAA's letter dated 28/08/2023. As of the Fall'17 semester when the charging of tuition was changed from charging by teaching hours to charging by ECTS, any lab fees which existed before have been abolished.

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We remain at your disposal.

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