Faculty of Engineering & Technology

Research Plan

الخطة البحثية لكلية الهندسة والتكنولوجيا

جامعة المستقبل

2017 - 2022

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Dean's Message

Faculty of Engineering & Technology at Future University in Egypt is committed to becoming amongst top research faculties of Engineering in the region, known for its excellence and innovation. Achieving this important goal pushes the Faculty to encourage and support the research by offering the necessary healthy atmosphere for rigorous R&D environment.

Faculty of Engineering believes that she possess three important pillars for carrying out serious scientific research: full-time active researchers faculty belonging to different world's best universities, well organized research laps prepared for upgrading , and necessary research budget offered by the university.

The research topics included in the Faculty research plan are thoroughly selected to be within the research interests of both Future University and the Egyptian Ministry of Higher Education. These research topics are directed for overcoming the problems facing the Egyptian society.

I am sure that the Faculty of Engineering, with its capabilities, can accomplish, with notable success, the activities included in its research plan. The indicator of achievement will be translated through the targeted scientific publications in International journals and conferences.

Prof. Mohamed Abdel Rahim Badr

Dean
Faculty of Engineering and Technology
Future University in Egypt

Foreword

Scientific research is, first of all, actions taken to produce and develop scientific knowledge. The research has the primary function formulating new questions and the production of new knowledge. Conducting research is valuable for developing and promoting the body of knowledge and information that drives innovation.

The Faculty of Engineering and Technology of Future University is keen to develop its capabilities in the field of scientific research aiming at realizing its vision to become one of the well-known international entities in this field

The research areas of the Faculty of Engineering and Technology are committed with the research orientations of Future University as well as with those introduced by the Ministry of Higher Education which translate the national strategy of Egypt.

The infrastructure available at the Faculty of Engineering and Technology seems promising for conducting serious research work. The potentialities of the staff members, from different international research schools, reflects the possibility of formation of diverse research teams capable of implementing the targeted research points included in the Faculty research plan

The follow-up of the research plan execution is a crucial manner to guarantee the success of the Faculty research plan to achieve its strategic goals.

Prof. Mostafa Zidan

Vice-Dean for graduate studies and research
Faculty of Engineering and Technology
Future University in Egypt

Vision, Mission, Values and Objectives

رؤية الكلية

تحقيق التميز محلياً وعالمياً في التعليم الهندسي والبحوث العلمية والتطبيقية وخدمة المجتمع"

Achieving excellence in Engineering education, scientific and applied research and community serving nationally and internationally

رسالة الكلية

توفر كلية الهندسة والتكنولوجيا بجامعة المستقبل بمصر بيئة أكاديمية وثقافية واعدة تُمكن من إعداد مهندس متميز قادر على المنافسة محلياً واقليمياً ومواكب لمتطلبات سوق العمل مهنياً وأخلاقياً وتحفز على إجراء البحوث العلمية المبتكرة وتساهم فى خدمة وتنمية المجتمع

The Faculty of Engineering and Technology at Future University in Egypt provides a promising academic and cultural environment that enables the graduation of outstanding engineers who are capable of competing nationally and regionally and well acquainted with the job market professionally and ethically. It also motivates conducting innovative scientific research and contributes to community serving and development.

Core Values	القيم الجوهرية
Distinction	التميز
Integrity and Transparency	النزاهة والشفافية
Justice, Accountability and Governance	العدالة والمساءلة والحوكمة
Society Responsibility	المسؤولية المجتمعية

Strategic Aims	Strategic Objectives
الغايات الإستراتيجية	**الأهداف الإستراتيجية**
كلية الهندسة والتكنولوجيا – جامعة المستقبل **مؤسسة علمية ذات تعليم هندسي متميز**	1. تعزيز قدرات أعضاء هيئة التدريس والهيئة المعاونة لضمان كفاءة العملية التعليمية
	2. التطوير المستمر للبرامج التعليمية وضمان جودة العملية التعليمية
	3. تطوير نظام متكامل للقبول والدعم والانشطة والخدمات الطلابية
	4. تعزيز الأداء المؤسسى للقيادات والجهاز الإدارى بالكلية
	5. تطوير وتحديث الموارد المادية للكلية
	6. تنمية قدرات الطلاب والخريجين بما يدعم الإبتكار والمنافسه فى سوق العمل
	7. تعظيم الإستفادة من برامج التعاون الدولى فى تحديث برامج الكلية وإعدادها للإعتماد الدولى
كلية الهندسة والتكنولوجيا - جامعة المستقبل **مؤسسة علمية متميزة فى البحوث العلمية والتطبيقية**	8. تطوير الانتاج البحثى للكلية كما وكيفا
	9. دعم وتحديث البنية التحتية للبحث العلمى بالكلية
	10. تشجيع وتحفيز أخلاقيات البحث العلمي
	11. إستكمال منظومة الدراسات العليا بالكلية
كلية الهندسة والتكنولوجيا – جامعة المستقبل **عنصر فاعل فى المشاركة المجتمعية وتنمية البيئة**	12. الإستغلال الأمثل لإمكانات الكلية والجامعة لخدمة المجتمع وتنمية البيئة
	13. تحقيق شراكات محلية والتأكد من رضاء المجتمع عن دور الجامعة

1- Introduction

Based on its deep tenet in improving the higher education, Future University in Egypt (FUE), as a well-known private higher education institution enjoying high reputation in Egypt and elsewhere abroad, is keen to participate in worldwide international activities concerning the enhancement of the higher education. This will certainly result in a reputable and pedagogical impact on the University academic profile and reflects in implementing its mission to become an educational institute committed to distinction, innovation and quality standards with the priority to stay abreast with the national, regional and international changes taking place in the interrelated fields of education, scientific research and community development, while consolidating values and professional ethics.

The scientific research, which refers to integrate the international dimension in education, is part of the strategic plan of the Faculty of Engineering and Technology - FUE. This can be achieved through graduate programs of masters and doctoral sets, lecturers and visiting professors, research activities, including joint projects and seminars, international research agreements, articles and essays published in international journals.

For achieving the above strategy, a research plan for the Faculty of Engineering and Technology - FUE 2017 -2022 has been formulated. This research plan is based on the following notions:

1) Be compatible with the Egyptian Ministry of Higher Education vision (plan 2020-2030).
2) Be compatible with the Faculty Mission and Vision.
3) Be compatible with the University research plan.
4) Dealing with the Egyptian National problems and needs.
5) Depending on the research capabilities and diversity of the Faculty staff members in different departments.
6) Exploiting the available and future upgraded capabilities of the Faculty labs.
7) Developing and enhancing the research background of the teaching assistants in different departments.
8) Integrating outstanding undergraduate students in research activities throughout their graduation projects.

2- Faculty Departments and Programs

Future University in Egypt was founded in 2006, by the Presidential Decree 254/2006 according to law number 101/1992 and executive regulations 219/2002. Faculty of Engineering and Technology (Accredited June 20, 2009) comprises the following departments and programs:

Department	Offered Programs
Department of Architectural Engineering	B.Sc. in Architectural Engineering
Department of Electrical Engineering	- B.Sc. in Electronics & Communication Engineering - B.Sc. in Electrical Power Engineering
Department of Mechanical Engineering	B.Sc. in Mechatronics Engineering
Department of Petroleum Engineering	B.Sc. in Petroleum Engineering
Department of Structural Engineering& Construction Management	B.Sc. in Structural Engineering& Construction Management
Department of Engineering Mathematics & Physics	None

3- Methodology of Issuing the Faculty research plan

The Methodology of issuing the research plan of the Faculty of Engineering & Technology (FET) has passed through the following steps:

a) At the level of each department

1) Exploring the urgent national problems and needs of the Egyptian society belonging to the department specialty which require engineering solutions.
2) Reviewing the outlines of Future University research plan belonging to the department specialty.
3) Investigation of the facilities available for research in different labs at the department.
4) Establishment of a database concerning the research background and activities of the staff members in the department.

5) Based on the above steps, main topics as well as other topics of research were defined. This step has been carried out by an assigned academic committee from the department, then discussed and approved by the department council.

b) At the faculty level

1) Multidisciplinary research topic of prim priority covering different engineering specialties was agreed upon through a higher academic committee composed of the vice-dean of graduate studies and research and heads of the faculty departments
2) The complete Faculty research plan (gathered from different previous processes) was discussed and approved by the Faculty council

4- SWOT Analysis

A SWOT analysis was carried out on both the University level and the Faculty of Engineering level. The results of this analysis, concerning the scientific research, can be demonstrated as follows:

Strength points

- Distinct and continuous support for scientific research
- High academic capabilities of faculty staff members
- Highly developed electronic system in the University
- Healthy infrastructure stimulating for research and development
- Agreements and partnerships with international Universities

Weak points

- Shortening in the number of staff members
- Limited space of the University central library compared with the number of staff members and TAs

Opportunities

- Willingness of many international Universities to hold academic Agreements and partnerships with Egyptian Universities
- Steady turnout of qualified staff members to join private Universities
- The increased willingness of Civil Society Organizations to cooperate with the Universities and educational entities
- The increased willingness on postgraduate programs and continuing education

Threats

- The increase in the number of private Universities attracting qualified staff members
- The increased demand on Egyptian highly qualified individuals from Arabic and International Countries

5- Committee for the Development of the Faculty Research Plan

A committee for the development of the faculty Research Plan was formed from:

Prof. Mostafa Zidan	Faculty Vice-Dean for graduate studies and research
Prof. Hossam Talaat	Director of the Faculty Quality Assurance Unit
Prof. Samir Sadek	Head, Architectural Engineering Department
Prof. Yehia Hindawy	Head, Mechanical Engineering Department
Prof. Mohamed Al-Aghoury	Head, Structural Engineering Department
Prof. Ismail Mahgoub	Head, Petroleum Engineering Department
Dr. Kamel Hassan	Head, Electrical Engineering Department

6- Research Plans

The following tables demonstrate the research plan of the Faculty of Engineering & Technology related to the Egyptian National problems and needs. The plan includes:

- The research topics suggested by each scientific department representing its contribution in the research fields pre-defined by both Future University in Egypt and the Ministry of Higher Education (Plan 2020-2030).
- The coordinator of each topic, the research team, the expected outcomes (e.g., number of scientific publications either in international journals or international conferences, …), and the required budget necessary for developing current labs.

6.1 FET Research Axes and Topics Mapped to FUE Research Axes (1/3)

FUE Research Axis related to FET	FET Research Axis	Department	Research Topics Contributing to FET Research Axis
FUE1 رفع كفاءة منظومة الطاقة في مصر، والبحث عن مصادر جديدة، وترشيد الاستهلاك	**FET1** Enhancing the Efficiency of the Egyptian Energy System, Integrating New Energy Resources, and Saving Energy	Architectural Eng. Dept.	**ARC 1.1**: Environmental Design & Energy Conservation
			ARC 1.2: Sustainability Rating Systems
			ARC 1.3: New Materials in Architecture & Building Construction
		Electrical Eng. Dept.	**EPR 1.1**: Planning, Energy Management and Operation of Renewable Energy based Microgrids.
			EPR 1.2: Protection and Control of Power Systems Including High Penetration of Renewable Energy Resources
			EPR 1.3: Enhancement of the energy system efficiency in Egypt
			EPR 1.4: Utilization and Control of Renewable Energy Resources in Egypt
		Mechanical Eng. Dept.	**ME 1.1**: Building efficient wind energy systems
			ME 1.2: Development and analysis of solar photovoltaic
			ME 1.3: Solar powered pump for urban areas
		Petroleum Eng. Dept.	**PE 1.1**: Characterization of organic quantity, quality, and maturity of source rocks & its effect on the economic value of asset
		Structural Eng. Dept.	**SME 1.1**: Energy Consumption Optimization in Construction Projects
FUE2 تأمين إستمرار توافر المياه الكافية والإستدامة البيئية لتلبية إحتياجات الحاضر والمستقبل	**FET2** Water Supply Continuity and Environmental Sustainability	Structural Eng. Dept.	**SME 2.1**: Monitoring of water resource Contamination

6.1 FET Research Axes and Topics Mapped to FUE Research Axes (2/3)

FUE Research Axis related to FET	FET Research Axis	Department	Research Topics Contributing to FET Research Axis
FUE4 حماية البيئة وتنمية الموارد الطبيعية ، ورفع الكفاءة الإنتاجية للمواد الخام والثروة المعدنية، ودعم برامج صون الطبيعة	**FET3** Environmental Protection and Enhance the production Efficiency of Raw Materials	Structural Eng. Dept.	**SME 3.1**: Behavior of concrete structures in different environment
			SME 3.2: Geotechnical LRFD design
			SME 3.3: Optimization of geotechnical solutions
			SME 3.4: Advanced Soil Contamination Modeling
FUE5 المساهمة في تطوير الصناعة الوطنية وتحسين الربحية من خلال تعميق التصنيع المحلي ومساعدة الصناعة على عبور الفجوة التكنولوجية الحالية.	**FET4** Development of National Industry	Electrical Eng. Dept.	**ECE 4.1**: Development of National Industrial Technology.
			ECE 4.2: Implementation of Advanced Techniques for Upgrading the Fields of National Industries.
		Mechanical Eng. Dept.	**ME 4.1:** Intelligent Control of automobile systems.
			ME 4.2: Modeling and Optimizing Micropumps for biomedical applications
			ME 4.3: Design and development of construction industry robots
			ME 4.4: generation of a complete set of planes kinematic chains
		Petroleum Eng. Dept.	**PE 4.1**: Investigation of the reservoir fluids (gas, oil, or water) that affect the reservoir performance
			PE 4.2: Assessment of different source rocks in Egypt as unconventional future energy resource (e.g., Gas shale & Oil shale)
		Structural Eng. Dept.	**SME 4.1**: Behavior of Meta Materials
			SME 4.2: Resource utilization, planning and control using Building Information Modeling
			SME 4.3: Sustainable Materials in Building Construction Environment
			SME 4.4: Behavior of cold-formed steel members and connections

6.1 FET Research Axes and Topics Mapped to FUE Research Axes (3/3)

FUE Research Axis related to FET	FET Research Axis	Department	Research Topics Contributing to FET Research Axis
FUE6 عبور الفجوة الرقمية والمعلوماتية، وتمكين تكنولوجيا المعلومات والإتصال لبناء مجتمع متطور وحديث، ورسم أفقه المستقبليةالمعلومات	**FET5** Applications of Information and Communication Technology for the Development of Society	Architectural Eng. Dept.	**ARC 5.1**: Monitoring and Modeling of Environmental Performance
			ARC 5.2: Architectural Conservation and Urban Heritage
		Electrical Eng. Dept.	**ECE 5.1**: Applications of Information and Communication Technology for the Development of Signal Processing.
			ECE 5.2: Applications of Information and Communication Technology for the Development of Image Processing.
			ECE 5.3: Microwave Photonics for Microwave and Signal Processing
		Structural Eng. Dept.	**SME 5.1**: Application of AI in Construction and Geotechnical Engineering

6.2 Research Plan of Architectural Engineering Department, Sept. 2017- Aug. 2022

Code	Research Topic	Objective	Coordinator	Outcomes (KPI's)								Resources			Estimated Budget (EGP)	Fund Source
				Diploma Project	M.Eng. Project	M.Sc. Thesis	Ph.D.	Conf. Paper	Journal paper	Seminar	Resrch. Project	Equipment	Software	Books		
ARC 1.1	Environmental Design & Energy Conservation	Investigating current and future alternative energy systems and technologies, green architecture and sustainability, building technologies; environmental impact assessment; typical installations; energy conservation; and analysis of recent technologies	Dr. Ashraf Gaafar		1	1		1	1	1		1	1	1	5,000,000	FUE
ARC 1.2	Sustainability Rating Systems		Prof. Sahar Morsi	1		1		1	1	1	1	1	1	1	100,000	FUE
ARC 1.3	New Materials in Architecture & Building Construction		Dr. Ashraf Gaafar			1		1	1	1	1	1			100,000	FUE
ARC 5.1	Monitoring and Modeling of Environmental Performance	Architectural and Urban Upgrading of Historical Sites, Modern applications in recording and documentation of buildings, Policies, Strategies and Administration of Upgrading Projects, Photogrammetry, Evaluation and Maintenance of Historical Buildings, Management of Historical Sites	Prof. Youssef El-Rafai	1		1		1	1	1	1	1	1		2,000,000	FUE
ARC 5.2	Architectural Conservation and Urban Heritage		Prof. Osama El-Rawy			1		1	1	1	1	1		1	100,000	FUE

6.3 Research Plan of Electrical Engineering Department – Electronics & Communication Engineering, Sept. 2017- Aug. 2022 (1/2)

Code	Research Topic	Objective	Coordinator	Outcomes (KPI's)								Resources			Estimated Budget (EGP)	Fund Source
				Diploma Project	M.Eng. Project	M.Sc. Thesis	Ph. D.	Conf. Paper	Journal paper	Seminar	Resrch. Project	Equipment	Software	Books		
ECE 4.1	Development of National Industrial Technology	Fault Diagnosis of Interconnects using Boundary Scan Architecture, Digital Testing of Analog Circuits, Fault Diagnosis of Digital Circuits	Dr. Mohamed El-Mahlawy			2	1	4	2						150,000	FUE
ECE 4.2	Implementation of Advanced Techniques for Upgading the Fields of National Industries.	Enabling development of national industrial technology via implementation of IoT platform: Secure embedded processor, power management, and MEMS .sensors	Dr. Ahmed Saeed					2	1	3	1	x			60,000	FUE

6.3 Research Plan of Electrical Engineering Department – Electronics & Communication Engineering, Sept. 2017- Aug. 2022 (2/2)

Code	Research Topic	Objective	Coordinator	Outcomes (KPI's)								Resources			Estimated Budget (EGP)	Fund Source
				Diploma Project	M.Eng. Project	M.Sc. Thesis	Ph. D.	Conf. Paper	Journal paper	Seminar	Resrch. Project	Equipment	Software	Books		
ECE 5.1	Applications of Information and Communication Technology for the Development of Signal Processing	Develop efficient power allocation techniques for the development of information and communication technology. Combining filter bank with bit loading to achieve high data rate techniques for 5G networks.	Dr. W. Al-Hanafy					3	2						100,000	FUE
ECE 5.2	Applications of Information and Communication Technology for the Development of Image Processing	Determining the source camera and detecting forged region in digital images. Magnifying the tiny motion in digital videos. Extracting the nanoparticle motion of the blood cells and estimate its velocity. Detecting and classifying brain tumors. Classification of mobile phones from its speech calls.	Dr. Omar Fahmy			2		5	6	4	1	x	x		300,000	FUE & Zweil City
ECE 5.3	Microwave Photonics for Microwave and Signal Processing	Design and implement a tunable microwave bandpass filter based on optical techniques	Dr. Kamel Hassan			1		1	1	2		1	1		200,000	FUE

6.4 Research Plan of Electrical Engineering Department – Electrical Power Engineering, Sept. 2017- Aug. 2022

Code	Research Topic	Objective	Coordinator	Outcomes (KPI's)								Resources			Estimated Budget (EGP)	Fund Source
				Diploma Project	M.Eng. Project	M.Sc. Thesis	Ph. D.	Conf. Paper	Journal paper	Seminar	Resrch. Project	Equipment	Software	Books		
EPR 1.1	Plannig, Energy Management and Operation of Renewable Energy based Microgrids	Enabling the introduction of large amount of renewable energy generation in the Egyptian power grid.	Prof. Hossam Talaat, Dr. Moneer Abo El Naga, Dr. Said Fouad		1	1		1	1	1				1	50,000	FUE
EPR 1.2	Protection and Control of Power Systems Including High Penetration of Renewable Energy Resources		Prof. Hossam Talaat, Dr. Said Fouad, Dr. Walid Atef	1		1		1	1	1	1		1	1	100,000	FUE + Research Institute
EPR 1.3	Model Predictive control for three-phase UPS Inverters	Operation and control of three-phase UPS Inverters using Continuous control set model predictive control technique.	Prof. Nasser Abdel- Rahim, Dr. Walid Atef					1	1				x		100,000	FUE
EPR 1.4	Control of a stand-alone doubly-fed induction generator used in wind energy conversion system feeding a three phase induction motor”	Performance analysis and control of a doubly-fed induction used in wind energy conversion systems (WECS) when feeding dynamic loads such as three-phase induction motors.	Prof. Naser Abdel-Rahim, Dr. Moneer Abo El Naga					1	1				x		100,000	FUE

6.5 Research Plan of Mechanical Engineering Department, Sept. 2017- Aug. 2022

Code	Research Topic	Objective	Coordinator	Outcomes (KPI's)								Resources			Estimated Budget (EGP)	Fund Source
				Diploma Project	M.Eng. Project	M.Sc. Thesis	Ph. D.	Conf. Paper	Journal paper	Seminar	Resrch. Project	Equipment	Software	Books		
ME 1.1	Building efficient wind energy systems	Enhancing the Efficiency of the Egyptian Energy System, Integrating New Energy Resources, and Saving Energy	Dr. Mohamed Rafaat Okelah		1	1		1	1	1	1	1	1	5	50,000	FUE
ME 1.2	Development and analysis of solar photovoltaic		Dr. Mahmoud Abdulrasheed		1	1		1	1	1	1	1	1	5	100,000	FUE + Research Institute
ME 1.3	Solar powered pump for urban areas		Dr. Mohamed Karali		1	1		1	1	1	1	1	1	3	100,000	FUE
ME 4.1	Intelligent Control of automobile systems.	Development of National Industry	Dr. Yehia Hendawy		1	1		1	1	1	1	1	1	5	100,000	FUE
ME 4.2	Modeling and Optimizing Micropumps for biomedical applications		Dr Mohamed Badran		1	1		1	1	1	1	1	1	5	3,000,000	FUE
ME 4.3	Design and development of construction industry robots		Dr. Mohamed Abdellatif		1	1		1	1	1	1	1	1	5	100,000	FUE
ME 4.4	generation of a complete set of planes kinematic chains		Dr. Hasan El Aishy		1	1		1	1	1	1	1	1	5	60,000	FUE

6.6 Research Plan of Structural Engineering & Construction Management Department, Sept. 2017- Aug. 2022 (1/2)

Code	Research Topic	Objective	Coordinator	Outcomes (KPI's)								Resources			Estimated Budget (EGP)	Fund Source
				Diploma Project	M.Eng. Project	M.Sc. Thesis	Ph. D.	Conf. Paper	Journal paper	Seminar	Resrch. Project	Equipment	Software	Books		
SME 1.1	Energy Consumption Optimization in Construction Projects	Enhancing the Efficiency of the Egyptian Energy System	Dr. Mahmoud Sobhy, Dr. Ibrahim Mahdi			1		1	1			-			40,000	FUE
SME 2.1	Monitoring of water resource Contamination	Water Supply Continuity and Environmental Sustainability	Dr. Ahmed Ebeid			1			1			-	Intern		30,000	FUE
SME 3.1	Behavior of concrete structures in different environement	Environmental Protection and Enhance the production Efficiency of Raw Materials	Dr. Ahmed Ebeid	2		2		2	2			Test Machine	Abaqus		60,000	FUE
SME 3.2	Geotechnical LRFD design		Dr. Hisham Arafat			1			1			-	Plaxis		30,000	FUE
SME 3.3	Optimization of geotechnical solutions		Dr. Ahmed Ebeid						2			-	Plaxis		30,000	FUE
SME 3.4	Advanced Soil Contamination Modeling		Dr. Ahmed Ebeid			1			1				Ansys-CFM		35,000	FUE

6.6 Research Plan of Structural Engineering & Construction Management Department, Sept. 2017- Aug. 2022 (2/2)

Code	Research Topic	Objective	Coordinator	Outcomes (KPI's)								Resources			Estimated Budget (EGP)	Fund Source
				Diploma Project	M.Eng. Project	M.Sc. Thesis	Ph. D.	Conf. Paper	Journal paper	Seminar	Resrch. Project	Equipment	Software	Books		
SME 4.1	Behavior of Meta Materials	Development of National Industry	Dr. Mohamed Galal					1	2			3D-printer	Ansys	Online	60,000	FUE
SME 4.2	Resource utilization, planning and control using Building Information Modeling	Development of National Industry	A. Prof. Ibrahim Mahdi			1	1	1	1			-	Primavira SSPA	Online	100,000	FUE
SME 4.3	Sustainable Materials in Building Construction Environement	Development of National Industry	Dr. Rana Khallaf			2		1	1			-	Internet Access	Online	60,000	FUE
SME 4.4	a. Behavior of cold-formed steel members and connections	Development of National Industry	Prof. Mohamed Al Aghory and A.Prof. Mahmoud Sobhy			1	1	2	2			Test Machine	Ansys	Online	65,000	FUE
SME 5.1	Application of AI in Construction and Geotechnical Engineering	Development of National Industry	Dr. Ahmed Ebeid			2		2	2				ExpGP C++	Online	40,000	FUE

6.7 Research Plan of Petroleum Engineering Department, Sept. 2017 - August 2022

Code	Research Topic	Objective	Coordinator	Outcomes (KPI's)								Resources			Estimated Budget (EGP)	Fund Source
				Diploma Project	M.Eng. Project	M.Sc. Thesis	Ph. D.	Conf. Paper	Journal paper	Seminar	Resrch. Project	Equipment	Software	Books		
PE 1.1	Characterization of organic quantity, quality, and maturity of source rocks & its effect on the economic value of asset	Source rock Evaluation	Prof. Ismaeil Mahgoub/ Dr. Moataz El-Shafeiy					x	x		x	x			350,000	FUE
PE 4.1	Investigation of the reservoir fluids (gas, oil, or water) that affect the reservoir performance	The variation of reservoir fluids properties with changing reservoir pressure	Prof. Ismaeil Mahgoub + Prof. Khaled Abdel Fattah + Dr. El-Saied Eissa					2	2		2	2			600,000	FUE
PE 4.2	Assessment of different source rocks in Egypt as unconventional future energy resource (e.g., Gas shale & Oil shale	Unconventional resources characterization	Prof. Ismaeil Mahgoub/ Dr. Moataz El-Shafeiy					x	x		x	x			350,000	FUE

7- Departmental Areas of Research, Staff Members and Available Facilities

In addition to the faculty research plan stated above, the individual research interest of the staff members in each department according to their specialties are listed in the following sections. Over and above, each department at the Faculty of Engineering and Technology has its specific areas of research. These areas depend mainly on the background of the staff in the department in addition to the facilities available for research in the department and the faculty as a whole. Details of specific research topics in different departments as well as the facilities available for research are described in the following sections

7.1 Architectural Engineering Department

7.1.1 Smart Buildings (Innovative Building Systems and Materials):

Research Areas:

Providing a guide to designing alternative energy systems for smart buildings, investigating current and future alternative energy systems and technologies, green architecture and sustainability, building technologies, environmental impact assessment, typical installations; energy conservation, and analysis of recent technologies.

Available Facilities:

Computer Labs.

Research Team:

Prof. Dr. Samir Sadek, Prof. Dr. Osama Elrawi, Dr. Ashraf Gaafar, Dr. Mohamed Aladly, and Dr. Tamer Samir, and Architects: Amr Mamdouh, Asmaa Gamal, Mohamed Mahmoud, Ayman Shawky, Ahmed Roshdy, Mazen Nabil

7.1.2 Digital Heritage (Documentation, Restoration, Conservation and Upgrading of Historical Sites)

Research Areas:

Architectural Heritage, Architectural and Urban Upgrading of Historical Sites, Modern applications in recording and documentation of buildings, Policies, Strategies and Administration of Upgrading Projects, Photogrammetry, Evaluation and Maintenance of Historical Buildings, Management of Historical Sites.

Available Facilities:

Computer Labs.

Research Team:

Prof. Dr. Youssef Elrafei, Prof. Dr. Osama Elrawi, Dr. Sahar Morsi, Dr. Ashraf Gaafar and Architects: Hanan Saleh, BothainaSamih, Dina Abdelrashid, EtharElshennawy, Aacer Mostafa, Mohamed Maher, Sofia Ayad

Architectural Department Staff Members

Prof. Samir Sadek
(Head of the Dept.)

Prof. Yousef El Rafie

Prof. Ossama Elrawy

Dr. Ashraf Gaafar

Dr. Sahar Morsy

Dr. Yehya Serag

Dr. Mohamed Eladly

Dr. Tamer Samir

7.2 Electrical Engineering Department

7.2.1 Optical Engineering

Research Areas:

Optical stabilized oscillator

Available Facilities:

The optical fiber communication lab has a lot of equipment necessary for scientific research. The lab is equipped with optical spectrum analyzer, OTDR, splicing machine, laser diodes, photo diodes, He-Ne laser and basic optical component (coupler, isolators, optical fibers … etc.).

Research Team:

Prof. Kamel Hassan and Eng. Mohamed Mousa

7.2.2 Microwave

Research Areas:

Smart antenna

Available Facilities:

The microwave lab has a lot of equipment necessary for scientific research. The lab is equipped with microwave line, spectrum analyzer, network analyzer, antenna system, and software tools.

Research Team:

Prof. Ibrahim Salem, Prof. LotfySakr, and Eng. Ahmed Zahran

7.2.3 Communication and Signal Processing

Research Areas:

Wireless communication, mobile communication, data communication systems and signal/image processing applications.

Available Facilities:

The communication lab has a lot of equipment necessary for scientific research. The lab is equipped with signal generators, digital oscilloscopes, spectrum analyzer, RF synthesizers, network analyzer, IPTV network system, and software tools.

Research Team:

Dr. Waleed Al-Hanafy, Dr. Omar Fahmy, and Eng. Mostafa Salah

7.2.4 Electronic Circuit Design

Research Areas:

Wireless communication, mobile communication, data communication systems and signal/image processing applications.

Available Facilities:

The electronic circuit design lab has a lot of equipment necessary for scientific research.

Research Team:

Dr. Mohamed El-Mahlawy, Dr. Waleed Al-Hanafy,andDr. Ahmed Saied

7.2.5 Power Systems and Operation of Renewable Energy systems

Research Areas:

Power System Protection, Power System Operation and Control, Power System Dynamics and Stability, Active Distribution Networks, Smart Grid and Micro grids.

Available Facilities:

The power system simulator lab is equipped with a comprehensive set of components including generating station simulators, network simulators, load simulators, SCADA System, Smart Meters, Computers and Different types of Protective Relays. This variety of components enables the simulation of small sized power systems. In addition, a number of application packages may be utilized for research purposes such as: MATLAB/Simulink with relevant toolboxes, PSCAD and Power World Simulator

Research Team:

Prof. HossamTalaat, Dr. Said Fouad Mekhamer and Dr. Walid Omran

7.2.6 Power Electronics and Control of Renewable energy Resources

Research Areas:

Operation and Control of UPS Inverters, Performance analysis and control of wind energy conversion systems (WECS), Photovoltaic generation Systems.

Research Team:

Prof. Naser Abdel Rahim, Dr. Moneer Abu-Elnaga, and Dr. Walid Omran.

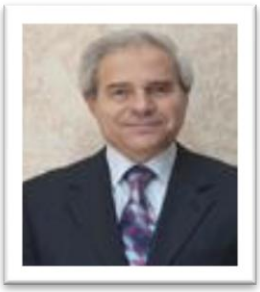
Electrical Engineering Department Staff Members

Prof. Mohamed Badr
(Dean)

Dr. Kamel Hassan
(Head of the Dept.**)**

Prof. Ibrahim Salem

Prof. LotfySakr



Dr. Mounir Abo-Elnaga

Prof. HossamTalat

Dr. Naser Abdelrahim

Dr. Said Mekhimer

Dr. Mohamed El-Mehalawy

Dr. Walid El-Hanafy

Dr. Walid Atef

Dr. Omar Fahmy

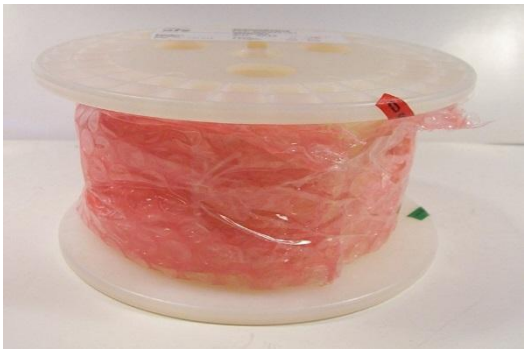
Dr. Ahmad Said

Departmental Labs Facilities

Fujikura 70S Fusion Splicing Machine

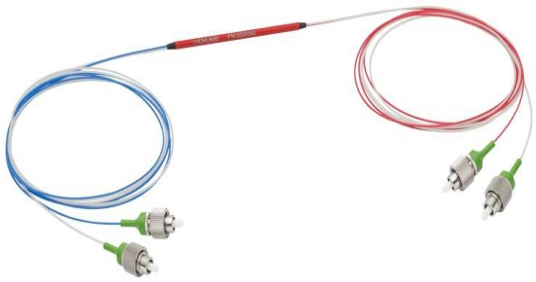
Optical time-domain Reflectometer (MT9090A from Anritsu)

Tunable Laser Source (Thorlabs TL1300/TL1550A)



C-band Erbium Doped Fiber

Optical Spectrum Analyzer (OSA) MS9740A- Anritsu



1550 nm 2x2 Polarization-Maintaining Fiber Optic Couplers / Taps (Thorlabs)

R&S®ZVB Vector Network Analyzers

Spectrum Analyzer (HAMEG HMS3010)

1.2GHz RF Synthesizer (Rohde and Schwarz HM8134-)

Hameg HM8150 Arbitrary Function Generator

MDO3000 Mixed Domain Oscilloscope | Tektronix

Rohde & Schwarz RTM 1054 4 Ch, 500 MHz, Digital Oscilloscope

WiMAX Trainer

Keithley DMM7510: 7½-Digit Graphical Sampling Multimeter

Keithley DMM7510: 7½-Digit Graphical Sampling Multimeter

Power System Simulator

7.3 Mechanical Engineering Department

7.3.1 Control and Robotics

Research Areas:

Control systems and applications, intelligent control, Robotics, Robots Applications (Service, Construction, and Industrial), Computer Vision and Image Processing, Active Vibration Control.

Available Facilities:

Mobile robots, Industrial Robot, Arduino kits, Rasberry Pi, Beagle bone. National Instruments active suspension module for studying base-isolated vibrations.

Research Team:

Prof. AbouelellaAbouelnaga, Prof Salah Foda, Prof. Mohamed Abdellatif, Dr Hasan El Aishy, Eng Ahmed Adel, Eng. Mohamed Abdelbarr and Eng. Rana Saleh.

7.3.2 Mechatronics and Microsystems

Research Areas:

Industrial systems, PLC, Microelectromechanical (MEMS) devices

Available Facilities:

Amatrol mechatronics systems trainer, PLC trainers, Hydraulic and pneumatic trainers, Robot arm, Solidworks License, LabVIEW2013 License.

Research Team:

Prof. YehiaHendawy, Dr. Mohamed Badran, Eng. Ahmed Adel and Eng. Mohamed AbdelBarr

Mechanical Engineering Department Staff Members

Dr. Abuelela M. Abuelnaga **(**Vice-Dean**)**

Prof. Mahmoud Abdul-Rasheed (Vice-Dean)

Prof. Yehia Hendawey (Head of Dept.)

Dr. Mohamed Raafat Okelah

Prof. Mohamed Abdellatif

Dr. El Sayed Mohamed Atta

Dr. Mohamed Fathy Badran

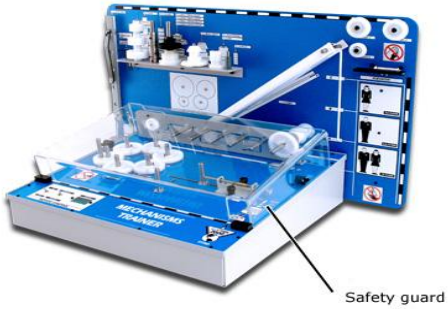
Dr. Hassan M. El Eashy

Dr. Mohamed Ahmad Karali

Departmental Labs Facilities

AMATROL Complete Training System (7 modules)

PNEUMATICS – Electro-pneumatics training system



(Mechanisms)

Fatigue Testing Machine

Universal Testing Machine for Tensile 10 Ton

Digital Torsion Testing Machine

Centrifugal Compressor

Flow Visualization Apparatus

Air Conditioning Kit

7.4 Structural Engineering & Construction Management Department

7.4.1 Strength and behavior of concrete structures

Research Areas:

Behavior of concrete elements, Strengthening & Repair of RC Members, and Seismic response of RC structures

Available Facilities:

General purpose testing machine – Strc. Lab.

Research Team:

Prof. Mohmed El-Aghoury, Dr. Ahmed Ebid, Eng. RehamRefaat(TA.) and Eng. MohmedTaher(TA)

7.4.2 Soil mechanics & Geotechnical engineering

Research Areas:

Geotechnical LRFD design, Optimization of geotechnical solutions, Advanced Soil Modeling

Available Facilities:

General purpose testing machine – Strc. Lab.

Research Team:

Prof. Hisham Arafat, Dr. Ahmed Ebid, Eng. MohmedDiab, (TA) and Eng. Mahmoud Abu-Aof(TA).

7.4.3 Structural mechanics

Research Areas:

Modeling and design of Meta-Materialism, and Advanced Structural Dynamics

Available Facilities:

General purpose testing machine – Struck. Lab.

Research Team:

Prof. Mostafa Zidan, Ass. Prof. Mahmoud Sobhy, Dr. Mohamed Galal, and Eng. Dina Hisham (TA).

7.4.4 Construction Management

Research Areas:

Decision Support System (DSS) for optimum alternative, BIM implementation in construction management, Supply chain and procurement.

Available Facilities:

Statistical analysis software

Research Team:

Prof. Ibrahim Abdel-Rashid (Ain Shams Univers),Dr. Ibrahim Mahdi, Dr. Ahmed Ebid, Eng. HossamHegazy (TA) and Eng. Dina Mahmoud (TA).

Construction Engineering Department Staff Members

Prof. Mostafa Zidan
(Vice-Dean)

Prof. Mohamed El-Aghory
(Head of the Dept.)

Dr. Hesham Arafat

Dr. Mahmoud Sobhy

Dr.Ibrahim Mahdi

Dr. Ahmed Abdel-Khaleq

Dr. Mohamed Galal

Departmental Labs Facilities

Loading Frame and Accessories

Machine for Measurement of Direct Shear for Soil

Machine for Measurement of Unconfined Pressurefor Soil

Machine for Measurement of Compressive strength of R.C. Cubes

Concrete Mixer

Drying Oven for concrete specimens

Machine for measurement of Cement Hardening

7.5 Petroleum Engineering Department

7.5.1 Stability of wellbore

Research Areas:

Prediction of earth pressure, in-situ stress and wellbore stresses, modeling and predicting the instability issues, increase the effectiveness of wellbore drilling through (reducing well construction time and cost, reducing casing related costs, reducing mud costs, reducing dependence on contingency casing designs, improvement of quality of formation evaluation data, maintaining hole integrity for maximum production)

Available Facilities:

Computer software (INTERACTIVE PETROPHYSISCS (IP), MATLAB, ANSYS)

Research Team:

Prof. Ismaeil Mahgoub, Prof. Khaled Abdel Fattah , Dr. El-Saied Eissa , and Dr. Moataz El-Shafeiy

7.5.2 Intelligent Multi-lateral wells strategy

Research Areas:

Integrating subsurface and surface models for the prediction of field performance, development of codes to solve the network for injection and production system, introduction of an optimization routine to the developed codes, evaluation of different parameters affecting the performance of the developed model.

Available Facilities:

Computer software (GAP, PIPESIM, C# CODE)

Research Team:

Prof. Ismaeil Mahgoub, Prof. Khaled Abdel Fattah , Dr. El-Saied Eissa ,and Dr. Moataz El-Shafeiy

Petroleum Engineering Department Staff Members

Prof. Ismaeil Mahgoub
(Head of the Dept.)

Prof. Khaled Abdel Fattah

Dr.Ibrahim Eldessouki

Dr. El-Saied Eissa

Dr. Moataz El-Shafeiy

8- Follow-up of the research plan

The follow-up of the research plan will be carried out through the following process:

- Annual reports indicating the percentage of execution
- Indicators of execution through the number of scientific publications, number of Ph.D. and M.Sc. theses, upgrading of existing laboratories, establishment of new laboratories.
- Number of new agreements with international Universities
- The size of participation in International Conferences and workshops