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Study on the organisation of doctoral programmes in EU neighbouring countries

Lebanon



Education and Culture DG

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1. Doctoral programmes data

Lebanon is characterized by an original higher education system with one very large public university (the Lebanese University) and about 40 Higher Education Institutes (HEI). HEI are also much marked by their confessional diversity. Parallel to this, the Lebanese state has a very limited role in the organisation of higher education.

Lebanon has not yet a statistical data system that allows for a precise description of doctoral programmes but the majority of doctoral candidates are located at the Lebanese University that gathers about half of the higher education students in Lebanon. Other universities (private ones) also organise doctoral programmes (Cf. Figure 1).

The science and technology base in Lebanon is small and **concentrated in three universities** : the Lebanese University, Saint Joseph University and the American University of Beirut, collaborating with the four research centres of the National Council for Scientific Research (CNRS) and the Lebanese Agricultural Research Institute¹. R&D from the private sector is extremely limited in Lebanon due to the economic landscape mainly composed of very small businesses².

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- Population: 4.2m
 - GDP per capita: €4,771
 - % of GDP spent on education: 1.8% (2009)
 - % of GDP spent on research: n/a
 - Doctoral candidates enrolled: 1,366

2008 UNESCO IUS data

Figure 1 Main HEI hosting doctoral programmes in Lebanon

	Date of creation	Total number of students (2007/2008)	% of total students population	Number of doctoral candidates
Lebanese University (UL) ³	1953	80 176	42%	<ul style="list-style-type: none"> • Doctoral school for Science and Technology: 86 (between 2007-2010) • Doctoral school of Law and political sciences: 350 • Doctoral school for human and social sciences
Beirut Arab University⁴	1960	17 661	10.6%	n/a
Saint Joseph University (USJ) ⁶	1875	9 361	5.6%	n/a
American University of Beirut (AUB) ⁸	1866	7078	4.2%	42 registered PhD (2010)

¹ Estime 2007, p.6

² the figure on Gross Expenditure on R&D as percentage of GDP is not available

³ <http://droit2.ul.edu.lb/>

<http://edst.ul.edu.lb/>

⁴ <http://www.bau.edu.lb/index.php>

⁶ <http://www.usj.edu.lb/recherche/index.htm>

⁸ <http://www.aub.edu.lb/provost/phdProgramsAUB/Pages/index.aspx>

	Date of creation	Total number of students (2007/2008)	% of total students population	Number of doctoral candidates
Holy Spirit University of Kaslik (USEK)⁹	1961	6 791	4.1%	n/a
Notre Dame University	1987	4 959	3.0%	n/a
University of Balamand	1988	3 194	2.0%	n/a

Source: Internet websites and CAS and CRTD¹⁰

Precise data on the number and distribution of doctoral candidates do not exist at the national level. However, there is an estimated 2100 doctoral candidates in Lebanon and the number is increasing. According to the Central Administration of Statistics, Lebanon

The most popular disciplines are to be found in social sciences and more precisely in law and history. The gender balance seems to be in favour of women in Lebanon. Most of the students (all three cycles) are Lebanese and foreigners account for 10 to 15% of candidates mostly coming from Arab countries.

2. Doctoral programmes

2.1 Doctoral programmes overall organisation

Doctoral programmes are first and foremost organised at the university or faculty level within each Higher Education Institution (HEI). The development of doctoral programmes is rather a bottom up than a top down process. Up to the very end of the 2000's, Lebanon was lacking of significant PhD programmes and still lack from a uniform academic standards¹¹ for all universities although all private universities must now submit their programmes to accreditation.

In 2002 was created a **Directorate General for Higher Education¹² (DGHE)** in order to reinforce the regulation powers of the Lebanese state. The DGHE regulates private universities that have to submit their programmes for State accreditation. In parallel, the Lebanese university is very autonomous and the tutorship of ministry of higher education on the council of ministers is very limited.

For the programmes accreditation process, a technical committee in the MEHE (an independent experts group coming from universities performing research) analyses applications according to a set of criteria (for instance the existence and quality of libraries available to students, the features of the proposed teachings, etc.). They edict a note for the Council for Higher Education. The **Council for Higher Education** was created in 1961 with the objective to provide license to new HEI. It gives a recommendation to the ministries Council. The licence is awarded upon a ministerial decree. The Equivalences Commission of Higher Education, different from the technical commission, then checks upon the conformity of universities to the proposed criteria.

⁹ www.usek.edu.lb
http://www.usek.edu.lb/useko8/Content/ResearchPublications_Nod510/CollegeDoctoral_Nod5859/Pge5860/FR/Index.asp

¹⁰ http://www.cas.gov.lb/index.php?option=com_content&view=article&id=101&Itemid=2

¹¹ Estime 2007, p. 14

¹² <http://www.higher-edu.gov.lb/>

Within universities, one can observe a real move since the end of the 2000's to **better structure** the doctoral programmes. The main reason for such a movement is the increased awareness of the Lebanese weaknesses regarding the national research system.

The **Lebanese University created three doctoral schools** in 2007, two of which were supported by the EU Tempus programme. The doctoral schools are in the field of i) Science and technology (Ecole Doctorale des Sciences et Technologie - EDST¹³), ii) of Law, political administrative and economic sciences and iii) Literature, Social and human sciences¹⁴.

The need for better organising doctoral programmes is spreading in the rest of Lebanon. Indeed, the AUB has launched 8 PhD granting degree programmes in 2008 in engineering, molecular biology, theoretical physics, Arabic and History¹⁵. The AUB has now 42 PhD candidates.

The Holy Spirit University of Kaslik (USEK) has also set up a doctoral college in 2008. Its mission is to coordinate the two USEK doctoral schools (one in exact sciences one in SSH), to monitor doctoral candidates and to prepare candidates to professional and academic careers. USEK proposes 46 doctoral programmes accredited by the Lebanese government¹⁶.

The Saint Joseph University also has three doctoral schools in the field of Human sciences and society, Science and health and Social sciences¹⁷.

2.2 Doctoral programmes structure

2.2.1 Definition of doctoral programmes

Several foreign systems have contributed to influence the development of higher education in Lebanon. This is reflected in the type of degree delivered in the public and private institutions. In the Lebanese university, the doctorate degree was designed according the French model of doctoral school delivering a Doctorate. In other institutions such as in the American University of Beirut, the American model prevails and the university awards PhDs.

2.2.2 Duration

Lebanon **is not a Bologna process signatory** but a large number of HEI started to implement the three cycles system. Moreover, the doctoral programmes shall last 3 years in average after the Master degree, as it is in EU countries.

However, practices may differ from one institution to the other. In Saint Joseph University, the doctorate is 180 ECTS credits¹⁸.

In the Lebanese University Doctoral school of law, the minimum is three years under which it is impossible to submit a thesis. Before the creation of the Doctoral school, the average duration of doctoral programmes was 5 years renewable on demand. Today, the candidate has the right for a one additional year but must motivate its demand. The real duration is 4 to 5 years with a yearly registration. In the EDST, the

¹³ <http://edst.ul.edu.lb/>

¹⁴ <http://www.ul.edu.lb/faculte/branches.aspx?facultyId=22>

¹⁵ <http://www.aub.edu.lb/provost/phdProgramsAUB/Pages/index.aspx>

¹⁶ http://www.usek.edu.lb/useko8/Content/AboutUs_Nod201/Facts_Nod429/Pge1564/FR/Index.asp

¹⁷ <http://www.usj.edu.lb/recherche/ecoles.htm>

¹⁸ USJ, Règlement intérieur

doctoral programmes are conducted with cooperation of foreign institutions and universities, so the duration is more strictly limited. The average duration is around 3 years. Doctoral candidates have to comply to the evaluation of their scientific report by the thesis committee of the doctoral school after having published at least one paper and other submitted to international journals and participations to international conferences.

In the AUB, the duration shall be four years and is limited by the maximum duration of the fellowship coverage. Doctoral candidates have to register every semester and they are also evaluated every semester.

2.2.3 Funding

The funding practices of doctoral programmes varies from public to private universities and from one discipline to the other.

In the Lebanese University, doctoral candidates pay a relatively small amount for the **registration** (\$500 per year (EUR 390¹⁹). This amount is the same for the three Doctoral schools. The tuition fees in the private universities are much higher. For instance, the American University of Beirut fees are \$700 (EUR 543) per credit which corresponds to \$10,000 per year on average (EUR 7,770). However, all AUB PhD candidates have fellowships with a tuition waiver.

For the **candidates living allowances**, there is a difference in the UL between the Doctoral school for Science and Technology (EDST) and Doctoral school of Law and Political, Administrative and Economic Sciences. The EDST provides funding for all doctoral candidates: in 2009-2010, out of 21 candidates, 20 received grants from the UL and one was funded from a research project. In this scientific field, the candidate must be present at its laboratory at all times which renders difficult to handle a complementary job. However, it is not mandatory to have a grant to start doctoral programmes.

In the Doctoral School for Law and Political, Administrative and Economic Sciences, almost all candidates have to work outside university for a living. Fellowships are scarce (from AUF or other international cooperation scheme) and only granted to the best candidates. Another condition is that fellowships is only granted to candidates which studies are under joint-supervision with a foreign institution. The doctoral candidates use to be able to be hired and paid by the university as assistants, which is not allowed anymore.

In the AUB, all enrolled doctoral candidates have some form of fellowships with tuition waiver. For instance in the Department of Arabic language and literature a monthly stipend of up to \$1000/month which fully covers tuition, for 10 months a year is available (on competitive basis). In return, PhD candidates have to engage in teaching in the middle of the third year of studies. Another example is the PhD program in the Biology Department. There are teaching assistantships that cover tuition fees (tuition waiver) and stipends (12 months per academic year at \$800 (EUR 621) per month with an annual increase of 2% thereafter. Candidates are also expected to do some teaching for undergraduates. Other forms of financial support may be available.

For the **funding of research** itself, two main sources of fund are available: either funds coming from universities or through research calls.

¹⁹ Exchange rate September 2010, 1USD = EUR 0,77

In private universities such as the AUB, most funding for research comes from the university endowment. The amount for research was about \$7m per year (of which half comes from NGOs, and the Lebanese government²⁰).

In the Balamand University, the Research council of the university²¹ organises a call for proposal every year for research projects. Some of the research funding can finance doctoral candidates. Other sources are external (EU Framework programmes, CEDRE²², AUF²³).

The **doctoral schools** themselves are financed by the UL and the professor paid by the Lebanese state. The EDST at Lebanese university provides grants for doctoral candidates from different programmes and sources such as the Azm and SAADEH association (social society) procure financial support for PhD thesis and this beyond other supporting institutes from Research financial program at Lebanese university, also grants accorded within bilateral memorandums with European institutions and universities and national council for scientific research (CNRS)

At the national level, the CNRS (National Council for Scientific Research) is one of the major sources of funding for PhDs. The CNRS PhD Fellowship Programme started in 1963. Over 450 PhD holders, who benefited from this programme between 1963 and 1983, now work in Lebanese universities (most of the senior staff of the CNRS are past recipients of these fellowships). The programme was frozen in 1983 but reactivated at the end of the 1990's. Since that date, the CNRS has also been granting fellowships to doctoral candidates from foreign universities who do their research at the Lebanese University and/or in a CNRS research centre²⁴.

Other funding is available through bilateral or other international cooperation, such as the CEDRE programme or the research grants and fellowships of the Agence Universitaire de la Francophonie (AUF) and EU Framework programmes (Cf. section 3.1).

2.2.4 Doctoral candidate status

Doctoral candidates in public and private universities always have the status of students and are always registered as such. In the AUB, doctoral candidates are registered as students and not staff, however in their fourth year, the financial support they receive come from their work as instructor in their respective departments.

2.2.5 Doctoral candidates rights

In line with their student status, doctoral candidates benefit from students' rights which are rather limited. Usually, female candidates can have maternity leaves but the programmes are too recent to find some examples.

Doctoral candidates at the Lebanese university (UL) benefit from the national social security coverage.

2.2.6 Organisation of doctoral programmes

The organisation of doctoral programmes tends to be more and more structured as proved by the development of Doctoral schools and doctoral programmes in several

²⁰ Estime, 2007, p. 20

²¹ <http://www.balamand.edu.lb/english/Research.asp?id=1367&fid=264>

²² <http://www.enseignementsup-recherche.gouv.fr/cid21216/programme-cedre-cooperation-franco-libanaise.html>

²³ www.auf.org

²⁴ Estime 2007

Lebanese universities. The organisation is influenced by France (model of French *Ecole doctorale*) but also the American model.

Joint-supervision is also a characteristic in certain fields. For instance, most if not all doctoral candidates in the EDST and 12% of the doctoral candidates in the ED of Law, political, administrative and economic sciences of the UL are under joint-supervision of a European university. This is a guarantee to have access to specific research infrastructure and it is also seen a guarantee of quality of the diploma. Candidates are registered in both universities and have to present their thesis in one of them. They usually spend 5 to 6 months a year abroad in the other university.

The private economic sector is not really involved in doctoral programmes and the links are not structured. This reflects more the socio-economic profile of Lebanon (with a majority of very small businesses) than a wish to separate academia from businesses.

2.3 Doctoral programmes content

The content and form of doctoral programmes are as diverse as the number of doctoral programmes available.

2.3.1 Research

Doctoral candidates tend to spend the majority of their time doing research, e.g. in the Lebanese University EDST, research constitutes 80% of doctoral candidates' schedule. The research theme is either proposed by a professor or proposed jointly by a candidate and a professor. The subjects have to be accepted by a research committee. A list of subjects is proposed on the EDST website for candidates to join projects.

2.3.2 Training during doctoral programmes besides research

The doctoral programmes include most of the time taught courses. The courses usually deal with the scientific discipline of the thesis rather than with the development of soft skills.

In the Lebanese University EDST, candidates have to achieve 30 credits of training either under classes in the discipline of the thesis subject or by participating to conferences and workshops. Candidates are encouraged to participate in the writing of research proposals.

The Lebanese University doctoral schools (Law and Political, Administrative and Economic Sciences and EDST – science and technology) organised usually every year a meeting gathering doctoral candidates (regardless their discipline of origin) in the spirit of the French annual event of “Doctoriales”. Doctoriales are training sessions set up to prepare the candidates to the challenges of the post-graduation period. The themes are linked to professional competences or valorisation of the research work. Other activities are organised annually such as Scientific journeys gathering researchers and supervisors to present all the research activities at the UL.

In the AUB, candidates have to attend PhD courses and have requirements in language and communication skills. They take courses in the first three semesters for a total of 48 credit hours beyond the Master degree. There are exams at each step.

2.3.3 Teaching during doctoral programmes besides research

From the interviews, it seems that teaching is not systematic, is not always a duty and is not usually formalised. However in the AUB, teaching is part of the duty of candidates receiving fellowships. During their fourth year of studies (but not before), they are expected to do some teaching or assistantship in exchange of the financial support they have received.

2.4 Doctoral programmes process: admission, supervision, monitoring and assessment

2.4.1 Admission/ recruitment

The admission criteria in all universities are known since they are published on the universities websites.

In the Lebanese University, the candidates must have a Master degree in research from the Lebanese University or equivalent. Candidates from other universities or foreigners do not have different admission criteria but diplomas from the Lebanese University are recommended. In the EDST, 30% of candidates use to come from other Lebanese universities but since the UL has created the corresponding Master degree, they are priority applicants.

The AUB has several checking points for admission. There are general admission requirements and additional requirement depending of the PhD programme. For instance on the Electrical and computer engineering PhD programme, candidates must submit Test scores from the general exam of the Graduate Record Examination, a written statement of purpose; three letters of recommendation; a portfolio that includes a resume and samples of work; an interview with faculty members will be conducted in person, by phone, or over the Internet²⁵.

2.4.2 Supervision system

Alongside the creation of Doctoral schools and programmes, the supervision rules and processes are strengthened.

The Lebanese University has developed a diploma for the supervision of doctoral programmes thanks to a Tempus programme²⁶ (Diplome d'Encadrement d'Etudes Doctorales).

In the doctoral school of Law and Political, Administrative and Economic Sciences, there is one supervisor and the EDST two. In the EDST, since doctoral programmes are under joint-supervision, there are always two supervisors to mentor the doctoral candidate. The content of the supervision is described in the signed convention (*charte*) between the candidate, the supervisor, the dean of the doctoral school and the responsible of the research unit or lab.

In the Doctoral school Law and Political, Administrative and Economic Sciences, a supervisor can monitor a maximum of seven doctoral thesis and 7 memoires. Yet, supervisors have more than seven candidates. It is easier for the EDST to start the organisation from scratch than to reform a previous system like in the doctoral school of law.

2.4.3 Doctoral thesis and defence

In the doctoral school of law of the UL, once the candidate submits his/her thesis, two professors read the thesis and can ask for a complete rewriting of the document. The candidate has then to adopt the required changes.

In the EDST, the candidate work is reviewed by at least two reporters appointed by the rector, must be habilitated to supervise research. Reporters must not belong to the doctoral school and HEI of the candidate. Reporteurs can be foreigners.

²⁵ http://www.aub.edu.lb/provost/phdProgramsAUB/Pages/Electrical_ComputerEngineering.aspx

²⁶ <http://tempus.ul.edu.lb/Activites2.php>

The jury is composed of the scientific competences of the individual. If the supervisor is member of the jury, he/she will not be able to be *reporter* or president of the Jury.

However, it is difficult to give an appreciation of the thesis defence because most doctoral candidates are in the middle of their studies and only a limited number of five candidates already defended their thesis.

The AUB requires as part of graduation at least one publication in per review journals. There is also external evaluation by Professors from the USA or Europe.

2.4.4 Quality assurance mechanisms

There is no “proper quality assurance and accreditation mechanism in place at the national level”²⁷ such as a Quality Assurance Agency. However, the MEHE has introduced quality assurance procedures within the licensing mechanisms and implemented by the Council for Higher education (see. 2.1).

The Higher Education Reform Expert (HERE) team²⁸, created by the MEHE, supported by the European Commission and assisted by the Tempus office has the mission to assist the higher education reform in Lebanon and provide information on several subjects such as quality assurance.

At the level of doctoral studies, Doctoral schools and programme in Lebanon are too recent to capture a global overview of practices.

2.5 After the graduation

There are no tracking systems for doctorate recipients at the national level and none at the level of universities. According to interviewees, one major problem faced by the research system is that doctoral candidates achieve a doctorate not to perform research but rather to teach. Indeed, most candidates are trying to find jobs within academia, as in the Lebanese University. However, there are only limited positions available for researchers in Lebanon due to the reduced landscape of research actors (mainly the three universities AUB, LU and USJ). There is no data on the doctoral graduates that leave the country.

3. International collaboration, mobility and joint doctoral degrees

3.1 International cooperation data

With regards participation to EU funded programmes, Lebanon has benefited from several programmes aiming at enhancing the doctoral programmes. Very targeted Tempus programmes, in particular, were implemented since 2002:

- In 2002, a Master of Research in the field of “City in Lebanon” the objective of which was to prepare for the establishment of a doctoral school on Science and Labour for the City in Beirut
- In 2004, the creation of a Doctoral school on law and Political sciences (see. 2.1) and a doctoral school of Science and Technology, both at the Lebanese university.

The participation to Marie Curie action is limited to one participation in FP7 from the American university of Beirut. Finally, with regards Erasmus Mundus, Lebanon is

²⁷ Lebanon TEMPUS fiche 2010, p.6

²⁸ http://www.tempus-lebanon.org/here/here_main_index.htm

involved in the JOSYLEEN partnership²⁹ which allow doctoral candidates from Lebanon to participate to exchange programmes with EU universities.

Lebanon is also participating to international cooperation programmes, the most important being the CEDRE³⁰ programme between France and Lebanon. CEDRE is a cooperation agreement signed in 1996 between the two governments with the objective to support the development of research in Lebanon.

In the UL doctoral school of Law, 12% of doctoral programmes are under joint supervision with a foreign partner, mostly France (e.g. Aix - Marseille III, Paris II, Grenoble II, Rennes I, Montpellier I). In the EDST, most if not all doctoral programmes are under joint supervision with a foreign university, mostly French universities.

3.2 Foreigners as doctoral candidates

Lebanon use to play a regional role in higher education resulting from the good reputation of some Lebanese universities and because of the limited supply of higher education in Lebanon's neighbouring countries. This role is decreasing nowadays but there is still an estimate of 10 to 15% of foreign candidates, mostly coming from Arab countries. Moreover, there is within several universities a wish to open the programme to non Lebanese doctoral candidates (Beirut Arab University, University Saint Joseph and the American University of Beirut)³¹.

3.3 National doctoral candidates going abroad

Lebanon is characterized by a quite mobile population and a large Diaspora all over the world that also impact the scientific population. According to the ESTIME report, it is assumed that there may be as much Lebanese scientists abroad than within Lebanon³². This ESTIME report on the evaluation of Scientific, Technology and Innovation Capabilities in Lebanon³³ indicates that most Lebanese PhD candidates, specifically in basic sciences, were trained abroad. One reason identified in the report was the lack of PhD programmes in Lebanon. Since the report was published (2007) we have seen that several PhD programmes have been created or reactivated in the largest universities of Lebanon which may now retain doctoral candidates. There is no information on the rate of return of PhD candidates from abroad.

It worth noticing that a lot of PhD programmes are supervised jointly by a Lebanese institution and by a foreign institution (such as in the Lebanese University EDST) so doctoral candidates carry out "sandwich" doctoral programmes, half of the time in Lebanon and the rest outside. However, brain drain remains a problem for Lebanon today.

²⁹ www.josyleen.eu

³⁰ CEDRE : Accord de coopération pour l'évaluation et le développement de la recherche

³¹ Ministère des Affaires étrangères et européennes, Ambassade de France au Liban, 2009, Fiche Enseignement supérieur Liban

³² Although there is no data available, the information is also relayed by the interviewees.

³³ Gaillard J., 2007, Evaluation of scientific, technology and Innovation capabilities in Lebanon, ESTIME

4. Challenges and possible future policy actions

Regardless the overall political and socio-economic context and the periods of conflicts that Lebanon had to go through even in the recent years, the country is facing several specific challenges that may constrain the development of doctoral programmes :

- **Small research landscape:** first of all, Lebanon has a limited number of actors performing research: the three universities AUB, UL and USJ. It is therefore crucial that these HEI have an efficient functioning. The 2006 priority setting exercise "Plan for Science, Technology and Innovation Policy (STIP) for Lebanon": insist on the need to improve the Lebanese research environment by improving the functioning of universities with "new standards and auditing". The quality assurance is therefore an issue for Lebanon.
- **Funding for doctoral programmes:** At the level of doctoral programmes, and similarly to many countries, the funding is scarce for doctoral candidates. Indeed, the little demand from industries or from the state for research results in a general little funding for research. There is also a little connexion between academia curricula and the business sector. This is mainly due to the economic landscape of Lebanon which is mainly composed of small family businesses. As a results, the business sector do not tap in the funding for doctoral programmes.
- According to the ESTIME report, Lebanon acknowledged a "**deprofesionalisation**" of the higher education staff due to a low rate of recruitment the last 10-15 years and a lot of temporary teaching staff operating in several universities. The consequence is little time devoted to research and according to one interviewee, a lack in the level of training of professors in some specific technologies that prevent the research system in entering new research areas. The STIP also advocate for the introduction of more graduates and "in particular PhD programmes".

The EU programmes already contributed to organise doctoral programmes trough the establishment of two doctoral school at the Lebanese University. The next challenges for EU actions would be to:

- Support the **development of research capacities in Lebanon**, for instance, supporting the funding of jointly supervised laboratories (by Lebanon and an EU country)
- Continue support to develop **quality assurance** related programmes
- Develop **funding on themes** and doctoral level curricula that corresponds to national priorities as well as themes that allow for a better integration to international and European research. It was noticed by several interviewees that the joint doctoral study programmes where geared on research subject rather adapted to the needs of the northern partners.

Appendix A - List of interviewees

Figure 2 List of interviewees

Name	Position	Organisation	Contact details
Aref ALSOUFI	Tempus Office	Ministry for Education and Higher Education	aalsoufi@ul.edu.lb
Zeinad SAAD	Dean of the Doctoral School for Science and Technology	Lebanese University	zsaad@ul.edu.lb
Leila SAADEH	Dean of the Doctoral school for Law, political and administrative sciences <i>Directeur de la Filière Francophone de Droit Université Libanaise</i>	Lebanese University	lsaade@ul.edu.lb
Chafik MOKBEL	Head of Research Council at the University of Balamand, member of Tempus HERE team	University of Balamand	chafic.mokbel@balamand.edu.lb
Ahmad JAMMAL	Director General for Higher Education	Ministry of Education and Higher Education	Tel: +961 3 333 917, ajammal@higher-edu.gov.lb
Nesreen GHADDAR	Associate Provost Qatar Chair in Energy Studies Professor	American University of Beirut	Tel: 01-350000 ext 2513

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³⁴ Evaluation of Science, Technology and Innovation capabilities in Mediterranean countries

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