



Program SPECIFICATION FOR PhD Degree in Biomedical informatics & Medical statistics Code: 1721800

University: Alexandria

Faculty: Medical Research Institute

Program Specification

A- Basic information

1- Program title: Ph.D Degree in Biomedical informatics & Medical statistics

2- Program type: single double multiple

3- Department(s): Biomedical informatics & Medical statistics

4- Coordinator: Prof. Dr. Fayek ElKhwesky

5- External evaluator(s): Prof. Dr. Aly Abdel Halim Hasseb

6- Last date of program specification approval: 8/1/2017

B- Professional Information

1- Program aims:

1. Explain the Theory and application of discrete time series models illustrated with forecasting problems.
2. Conduct Meta analysis

Describe the Assessment of κ clinical measurement

3. Acquire basic knowledge for methods of registration & reporting of chronic diseases.
4. Explain Hardy-weinberg equilibrium
5. Recognize Genetic linkage (model based, model free)
6. Acquire the Critical Appraisal of an article
7. Explain what registration of chronic diseases is.
8. Recognize GIS applications in Africa, Using GIS software.
9. Explain the General hazards model
10. Use and apply the Six Sigma tools to Define, processes of health care delivery, improve and control the complex processes of health care delivery
11. Formulating health questions, netting the evidence
12. Describe Bioinformatics tool box: Analyze genomic, proteomic, & microarray data
13. Discuss the Economics in health care



14. Explain the Principal component Analysis
15. Recognize how to form Evidence-Based guidelines (EBG),
16. Conduct multiple regression
17. Explain the Value chain analysis
18. Recognize & Conduct Non parametric statistics
19. Understand & conduct Test of association, Odds ratio, Relative Risk
20. Working with Frame Design on the Web, Creating Image Maps with a Web Page
21. Describe the Graphical presentation of data (for quantitative & qualitative data)

2- Intended learning outcomes (ILOs)

a- knowledge and understanding:

- a1- **Recall** time series data
- a2- Recall the different models of meta analysis
- a3 - Define statistical validity and precision of a measure
- a4- **List** uses of registries
- a5- **Discuss** the role of genetic epidemiology
- a6- Discuss concepts of twin studies
- a7- Understand factors affecting applicability of research results.
- a8- Define and explain functions of a disease registry.
- a9- **Explain** the key concepts of Geographic Information Systems (GIS)
- a10- Explain the concept of Survival analysis
- a11- **List** the uses of six sigma in quality
- a12- **Recall** websites related to EBM
- a13- Describe Molecular Biology and Biochemistry: Molecules and Processes
- a14- Describe methods of representing & using knowledge
- a15- Describe steps of factor analysis
- a16- Define clinical guidelines and its components
- a17- **Recall** the mathematical tools and likelihood theory necessary to describe generalized linear models
- a18 - Explain, using examples, why each of the fundamental concepts is important when applied to the study of health
- a18- Explain different statistical tests for comparing more than 2 groups in case of mixed design
- a19- Select the statistical tests used for agreement between 2 methods or 2 raters

b- Intellectual skills:

- b1- Interpret time series plots
- b2- appraise the quality of studies.
- b3- categorize the sources of errors in measurements.
- b4- Differentiate between primary and secondary data sources.
- b5- examine the application of Hardy Weinberg law
- b6- categorize the role of quantitative genetics
- b7- Analyse the relation between objective and design of research
- b8- categorize the importance of medical coding.
- b9- examine geographical problems that can be solved using GIS
- b10- Choose the appropriate survival analysis
- b11- Compare a set of alternative remedies for quality improvement
- b12- Select appropriate websites for different clinical questions
- b13- Analyse different processes for molecular biology.
- b14- contrast the weak & strong AI theses
- b15- compare situations for data reduction



- b16- Calculate the domain scores given by appraisers
- b17- Choose appropriate regression analysis when the outcome is discrete, count or categorical variable
- b18- Select which costs are relevant to a given economic evaluation
- b19- Decide the appropriate test for comparison between groups

c- professional and practical skills:

- c1- Decompose time series data using both multiplicative or additive models
- c2- Interpret the results of meta-analysis & Qualitative and Quantitative methods & Assessing bias and variation of effect & investigating heterogeneity
- c3- Develop questionnaire with high validity and reliability
- c4- Practice ICD-10 coding and notice the difference from ICD-9 coding.
- c5- Appraise medical literature using different research designs.
- c6- Illustrate with examples different statistics used in chronic disease and cancer registries.
- c7- Design database using GIS software
- c8- Interpret the results of the output of Kaplan Meier and Cox regression model
- c9- Calculate Sigma level for a process
- c10- Arrange the Laboratory Rotation System
- c11- Construct a Markov model
- c12- Apply statistical factor analysis on SPSS program
- c13- Apply non-linear techniques critically to real world data using statistical packages
- c14- Perform a discounting for costs and consequences
- c15- Use Statistical analysis of data regarding more than 2 groups
- c16- Perform Kappa test and ROC curve analysis on the statistics software

d- General and transferable skills:

- d1- Communicate through group discussion
- d2- Work as a part of team
- d3- Develop skills in Information Technology
- d4- Learn skills for planning and organization
- d5- Problem solving competency
- d6- Develop skills of observation

3- Academic standards

3a External references for standards (Benchmarks)

Generic Academic Reference Standards of the National Authority for Quality Assurance and Accreditation of Education (NAQAAE)

**Date of Academic Reference standards (ARS) approval by Institute Council:
12/2/2014**

3b Comparison of provision to selected external references



NAQAAE	ARS
A1-Basic facts , theories, of the specialty and related subjects/ fields	A1-Recognize basic facts of the Meta analysis& different statistical tests used in Evaluation of diagnostic tests.
A2-Mutual relation between professional practice and effects on environment	A2-Recognize mutual relation between Regression Bootstrapping and Jack-knifing Cross-validation
A3-Recent advances in the field of practice	A3-Recognize recent advances in Computational Biology: Genomes, Networks, Evolution Details of ethical & legal practice
A4-Details of ethical & legal practice	A6-Discuss ethical considerations in identifying the notions of rational behavior and intelligent agents&
A5 -Quality standards of the practice	A4-Recognize quality standards of methods of screening of diseases
A6- Design, conduction & publishing of scientific research	A5-Review Design, conduction & publishing of clinical guidelines and its components
A7- Ethical considerations in different types of scientific research	A6-Discuss ethical considerations in identifying the role of genetic epidemiology.
B1- Analyze, deduce, extrapolate & evaluation of information	B1-Analyze, deduce, extrapolate & evaluation of diagnostic tests
B2- Solve the majority of problems in the specialty according to the available data (complete or incomplete)	B2-Analyze Interpret the results of GIS analysis to solve population health research
B3- Conduct research studies that add to the existing specialty knowledge	B4-Conduct research studies that decide how to Formulate health questions
B4- Publish scientific articles/papers (in indexed journals)	Publish scientific articles/papers through thesis survival analysis Cox model.
B5- Plan and implement (or supervise implementation of) enhancement & Improvement approaches to practice	B6-Differentiate and implement (or supervise implementation of) different domains of the guideline assessment tool to practice
B6- Take decisions in various professional situations (including dilemmas & controversial issues)	B3-Solve the majority of problems in Sigma tools to improve and control the complex processes of health care delivery)
B7- Add to the specialty field through creativity & innovation	B7,8-Review decisions in various results of GIS analysis to solve population health research, Add to the specialty field through creativity & innovation
B8- Manage discussions on basis of evidence and proofs	B9-Evaluate and manage discussions on basis of evidence and proofs
C1- Competent in all basic and all required advanced professional skills (to be determined	C1-Assess all basic and all required advanced professional skills (Do Statistical analysis & interpret the results of ROC curve



according to the specialty board/ department)	
C2- Write and appraise reports	C2-Apply reports and perform critical appraisal of different studies
C3-Evaluate <i>and improve</i> methods and tools used in specialty	C3-Apply and improve different methods of registration
C4-Use technology to advance practice	C4-Assess different technologies to practice and Interpret the results of meta analysis
C5- Plan professional development courses to improve practice and enhance performance of juniors	C5-Construct professional development courses to improve discovery sources of bias in research
D1- Communicate effectively using all methods	D1-Communicate effectively using all methods
D2- Use information technology to improve his/her professional practice	D2-Use information technology to improve his/her professional practice(Six Sigma, GIS)
D3- Teach and evaluate others	D3,e1-Evaluate others through critical appraisal
D4- Perform self appraisal & seek continuous learning	D3-Perform self appraisal & seek continuous learning Through appraising the evidence from multiple studies
D5- Use different sources of information to obtain data	D4-Work with different sources of information to obtain data for evidence based guidelines
D6- Work in teams as well as a member in larger teams	D5-Work as team leader as well as a member in larger teams
D7- Manage scientific meetings and appropriately utilize time	D6 -Communicate and manage scientific meetings and appropriately utilize time

4- curriculum structure and contents

4.a program duration:(3-5 years)

4.b program structure :

**4.b.i- No. of hours per week in each year/semester:**

Semester	Core Courses	Elective Courses
	No. of hours	No. of hours
First semester	4	4
Second semester	3	3
Third semester	4	3
Fourth Semester	3	3

4.b.ii- No. of credit hours	Lectures	<input type="text" value="18"/>	Practical	<input type="text" value="24"/>	Total	<input type="text" value="30"/>
	Compulsory	<input type="text" value="14"/>	Elective	<input type="text" value="10"/>	Optional	<input type="text" value="0"/>

4.b.iii- No. of credit hours of basic science courses (elective from other departments except for computer and statistics)

No.	<input type="text" value="0"/>	%	<input type="text" value="0"/>
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4.b.iv- No. of credit hours of courses of social sciences and humanities.

No.	<input type="text" value="0"/>	%	<input type="text" value="0"/>
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4.b.v- No. of credit hours of specialized courses

No.	<input type="text"/>	%	<input type="text"/>
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4.b.vi- No. of credit hours of other courses (e.g. statistics, computer)

No.	<input type="text" value="24"/>	%	<input type="text" value="100"/>
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4.b.vii- Field Training

No.	<input type="text" value="24"/>	%	<input type="text" value="100"/>
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4.b.viii- Program levels (in credit-hours system)

Student is required to pass at least 12 credit hours with CGPA not less than C+ before submitting a thesis proposal.

**5- Program Courses****5.1- Compulsory**

Code No.	Course Title	No. of credit hours	No. of hours /week	
			Lecture	Practical
1721801	Time series analysis	3	2	2
1721802	Systematic Review and Meta-analysis	4	2	4
1721803	Clinical Measurements and Accuracy of Diagnostic Tests	3	2	2
1721804	Advanced Topics in Registration of chronic diseases	4	2	4

5.2- Elective I (add no. of hours)

Code No.	Course Title	No. of credit hours	No. of hours /week	
			Lecture	Practical
1721805	Basic genetic epidemiology	3	3	0
1721806	Advanced Genetic epidemiology	2	2	0
1721807	Critical Appraisal & Journal club	3	1	4
1721808	Principles of Registration of Chronic Diseases	3	2	2
1721809	GIS and Open Source Systems	3	2	2
1721810	Survival analysis	2	1	2
1721811	Statistical tools in Quality of health care	3	2	2
1721812	Evidence Based Medicine	2	2	0
1721813	Advanced Bioinformatics	4	3	2
1721814	Artificial Intelligence	3	2	2
1721815	Data reduction, classification and scale reliability	3	2	2
1721816	Evidence based guidelines	3	3	0
1721817	Regression analysis	3	2	2
1721818	Economics of Health & Medical care	2	1	2
1721819	Intermediate Medical Statistics	2	2	2

**5.3- Elective II (add no. of hours)**

Code No.	Course Title	No. of credit hours	No. of hours /week	
			Lecture	Practical

5.4- Optional – (none)**6- Program admission requirements**

Postgraduate students with M.Sc. or an equivalent degree in Medical Informatics

7- Regulations for progression and program completion

For the progression and completion of the program to obtain the degree of **Biomedical informatics & Medical statistics**, the student must:

- 1- Complete 24 credit hours with CGPA of at least C+.
- 2- Submit a thesis validity report by an examination committee approved by the department council and their members include at least two external examiners.

8- Evaluation of Students enrolled in the program.

Tool evaluation	Intended learning outcomes being assessed
Written	ILOs a & b
Practical	ILOs c
Oral	ILOs a ,b & d
Semester Work	ILOs b & d

Evaluation of the Program



Evaluator	Tool	Sample
1- Senior students	Interview	At least 50 %
2- Alumni	Interview	Representative sample
3- Stakeholders (Employers)	Interview	Representative sample
4- External Evaluator(S) or External Examiner (s)	Reports	Dr. Aly AbdelHalim Haseb
5- Other		

Dates of Previous editions/revisions:

Editions/Revisions Number	Date
Edition no.1	2009
Edition no. 2	2011
Edition no.3	5/6/2014
Edition no.3, revision no.1	12/2014
Edition no.3, revision no.2	10/2016
Edition no.3, revision no.3	9/ 2017

Program coordinator:

Name: Dr.Iman El Sayed

Signature: Dr.Iman El Sayed

Department Head:

Name: Dr. Fayek El Khwesky.

Signature: Dr. Fayek El Khwesky.

Date of Department Council Approval: 6/9/2017



Medical Research Institute

Department Of Biomedical informatics & Medical statistics



Teaching methods versus courses

	1721 801	1721 802	1721 803	1721 804	1721 805	1721 806	1721 807	1721 808	1721 809	1721 810	1721 811	1721 812	1721 813	1721 814	1721 815	1721 816	1721 817	1721 818	1721 819	1721 820
Lecture	x	x	x	x	x	x	x	x	x	x	x	x	x	X	x	x	x	X	x	x
Practical	x	x	x	x			x	x	x	x	x		x	X	x		x	X	x	X
Brainstorming		x					x		X	x		x			x					
Discussion Group		x	x	x	x	x	x	x	X	X	X	x	x	X	x	X	X	X		X
Problem Solving	x	x		x	x		X		X	X		x			x	X	X	X	X	x
Case Study			X	x	X							x								
Field Tran																				
Roleplay												x								
Training Worksho																				
Self Learn		x	x	x	x	x	x	x	x	x	x	x	x	X	x	x	x	X	x	
e-learnin												x		X						
Project	x						x		x			x		X			x	x		