Program SPECIFICATION FOR MASTER Degree in Experimental surgery

Code: 1714700

University: Alexandria **Faculty:** Medical Research Institute

Program Specification

A. Basic information

1- Programtitle:Master in experimental surgery

2- Program type: **Single** [√] **double** [ ] **multiple** [ ]

3- Department(s):Experimental and clinical surgery

4- Coordinator:Medhat Anwar

5- External evaluator: Professor Mohamed Gaber

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

B. Professional Information

1- Program aims:

1. To provide the student with the appropriate knowledge about laboratory animal as a model of human disease and laboratory animal facility and to provide the student with an appropriate background covering husbandry of laboratory animal and the biological testing and carcinogenesis.
2. To provide the student with the appropriate knowledge aboutlegal, ethical & educational aspects, the principles of surgical research laboratory and practical aspects and with an appropriate background coveringoperative facilities, anesthesia facilities andpost-operative intensive care facilities.
3. To provide the student with the appropriate knowledge aboutexperimental design, experimental tissue trauma & healing, the principles of experimental oncogenesis, peritoneal adhesion and experimental models in portal hypertension.
4. To provide the student with the appropriate knowledge about ethical & legal aspects of medical practice, the principles of asepsis, sterilization & disinfections and antimicrobial therapy in surgery and appropriate background covering computer and data base and how to write a protocol of a thesis.

5. To provide the student with the appropriate knowledge about general surgical anatomy and general surgical pathology as well as the principles of surgery & the immune – compromised and principles of ICU.
6. To provide the student with the appropriate knowledge about anatomy of abdominal wall & groin and peritoneum, omentum & mesentery, the principles ofscrotal & testicular disease and an appropriate background covering surgery of portal hypertension, GERD, skin & soft tissue tumors, surgery of the breast.
7. To provide the student with the appropriate knowledge about surgery of stomach & duodenum and upper & lower GIT bleeding, the principles of intestinal obstruction and intestinal fistulae and an appropriate background covering cancer colon & rectum, inflammatory bowel diseases, stomas, pelvic floor disorders and anal fissures, fistula & piles.
8. To provide the student with the appropriate knowledge about surgery of the liver and pancreas, the principles of biliary surgery (cholecystitis, cholangitis, biliary strictures, obstructive jaundice, biliary tumors) and an appropriate background covering splenic disorders, splenectomy, lymphadenopthy and lymphoma.
9. To provide the student with the appropriate knowledge about grafts and flaps, stages of wound healing, face and hand injuries, burns, the principles of soft tissue sarcoma, an appropriate background covering lower limb ischemia, varicose veins, DVT, post-phlebetic syndrome, diabetic foot infection, A-V fistulae, endovascular surgery, thyroid tumors, goiter, parotid tumors, neck swellings and the principles of bladder tumors, renal, ureteric & bladder stones, urothelial tumors, prostatic tumors, urinary tract injuries.
10. To provide the student with the appropriate knowledge about equipment & laboratory facilities, the principles of experimental design and an appropriate background covering microvascular anastomosis.
11. To provide the student with the appropriate knowledge about assessments for experimental transplantation and ethical & legal aspects of transplantation, organ donation- laboratory techniques & donor-recipient match. To provide the student with an appropriate background covering renal transplantation&immune-suppression.
12. To understandfundamentals of laparoscopic surgery and medical malpractice in laparoscopic surgery: laparoscopic appendectomy and laparoscopic repair of inguinal and ventral hernias. Also to illustrate role of laparoscopy in malignancy and in biliary surgery.

2- Intended learning outcomes (ILOS)

a- knowledge and understanding:

A1. Recalllaboratory animal facilities. Discuss husbandry of laboratory animal. Describe laboratory animal as a model of human disease. Determine the biological testing and carcinogenesis.

A2. Recalllegal, ethical & educational aspectsof Experimental Surgery.Name the principles of surgical research laboratory and practical aspects.Discuss operative facilities, anesthesia facilities andpost-operative intensive care facilities.Review methods of care of lab animals.

Define lab animal as a training model. Discuss various laparoscopic procedures in animals

A3.Listdifferent experimental design, Define factors affecting animal care. Recallexperimental tissue trauma &healing. Recall principles ofexperimental oncogenesis, cancer genetics and gene therapy. Describeexperimental models in portal hypertension. Discussexperimental peritoneal adhesion.

A4. Recallethical, legal aspects of medical practice, survival tables, data base writing, how to write a protocol and duties of surgical practitioner. Defineprinciples of asepsis, sterilization, disinfections, the needs of antibiotic therapy, data base and survival tables. Describe indications, contraindications and side effects antimicrobial therapy in surgery, stages of trauma and perioperative care. Describe evidence based surgery, survival tables, computer and data base. Discuss different tissue responses to surgical trauma, evidence base, survival tables, and antibiotic types and risk assessment. Explain how to write a protocol of a thesis, how to assist in surgery and how to get the evidence.

A5. Outline the main topics of general surgical anatomy and general surgical pathology and pathophysiology. Discussoperative theater problems and how to be avoided. Define peri-operative management of surgically ill immune-compromised patient and precautions suggested to minimize the risk of surgery. State the principles of ICU. Describe different surgical positions. Define surgical audit and understand its role.

A6.Describe surgical anatomy of abdominal wall & groin and peritoneum, omentum & mesentery. Discussdifferent scrotal & testicular diseases (inflammatory conditions and tumors). Classify causes, clinical presentation, complications and management of portal hypertension. Recalletiology, clinical presentation, complications and management of GERD. Describe skin & soft tissue tumors. Discuss etiology, clinical presentation, complications and management of benign breast tumors and cancer breast.

A7.Recalletiology, clinical presentation, complications and management of peptic ulcer, intestinal obstruction and inflammatory bowel diseases. Review management of upper & lower GIT bleeding. Describe etiology, clinical presentation, complications and management of cancer stomach, cancer rectum and cancer colon. Describe pelvic floor disordersandanal fissures, fistula & piles. Define different types and complications of stomas. Discuss etiology, clinical presentation, complications and management of intestinal fistulae

A8. Recalletiology, clinical presentation, complications and management of liver abscesses, hydatid cyst and liver tumors. Review etiology, clinical presentation, complications and management of pancreatitis (acute and chronic) and pancreatic tumors and fistula. Describe etiology, clinical presentation, complications and management ofcholecystitis (acute and chronic), obstructive jaundice (benign & malignant), biliary fistula, strictures and biliary tumors. Recall splenic disorders, indications and details of splenectomy. Describe etiology, clinical presentation, complications and management of lymphadenopthy and lymphoma. Discussdifferent types of cholecystectomy.

A9.Listdifference between grafts and flaps. Recall types & stages of wound healing and management of face and hand injuries. Describe clinical presentations, complications and management of burns with emphasis on inhalational burn. Recall types, clinical presentations, complications and management ofsoft tissue sarcoma. Discuss etiology, clinical presentations, complications and management of acute and chronic lower limb ischemia, varicose veins, DVT, post- phlebetic syndrome, Recallpathophysiology and management of diabetic foot infection, Emphasis on endovascular surgery as a form of minimal invasive procedure. Describe etiology, clinical presentations, complications and management of goiter, thyroid

cancer and parotid tumors. Discuss etiology, clinical presentations, complications and management of cancer bladder, cancer prostate, BPH and urinary tract injuries and stones.

A10. Listdifferent types of equipment & laboratory facilities. Discuss types, complications of experimental design. Review micro vascular anastomosis. Discusscomplications associated with micro vascular anastomosis. Define safety precautions that must be taken during handling of equipment & laboratory facilities. Describe different investigational techniques that must be taken to ensure success of anastomosis.

A11. Recallethical & legal aspects of transplantation. Discuss principles of organ donation- laboratory techniques & donor-recipient match. Review immunosuppressive drugs and their different mechanisms of action. Define indications, contraindications, and complications of renal transplantation. Define and discuss immune system. Review organ donation- laboratory techniques & donor-recipient match.

A12. Recallfundamentals of laparoscopic surgery: historical perspectives, the anesthetic implication of laparoscopic surgery, methods of creating a pneumoperitoneum, laparoscopic suturing and knot tying. Describe details of laparoscopic appendectomy. Describe laparoscopic repair of inguinal and ventral hernias. Review laparoscopic biliary surgery: laparoscopic cholecystectomy, cholangiography and CBD exploration. Describe diagnostic laparoscopy in pelvic pain. Review the role of laparoscopy in malignancy.

b- Intellectual skills:

B1. Analyzeproblems of laboratory animal facilities, prioritize them, and generate a list of different solutions for each problem. Predict diseases outcome in laboratory animal used as model for human diseases. Use the results of all tests on laboratory animal ordered to modify the human diseases accordingly. Suspect complications in Operative Techniques in Laboratory animal.

B2. Analyze legal and ethical entities of Experimental Surgery. Examine the clinical and investigational results, with the knowledge and the skill to ensure successful surgical research. Appraise operative facilities, anesthesia facilities and post-operative intensive care facilities. Analyze variable methods used in the care of lab animals. Categorize anesthesia techniques and training model used in lab animals. Distinguish laparoscopic procedures in animal

B3.Criticize complications of experimental design. Distinguish the role ofexperimental models in treatment of portal hypertension, Analyse different promoters of tissue healing from experimental models. Categorize oncogenetic pathways, gene therapy and cancer genetics. Analyse consequences of peritoneal adhesions.

B4.Categorize complications of antimicrobial therapy in surgery, needs of surgeon intraoperatively, consequences of trauma and the needs of scientific writing. Appraise problems of asepsis, sterilization, disinfections, antibiotic use, inflammatory response and ethical practice. Analyze tissue response to surgical trauma, survival tables and data base. Distinguish the clinical and investigational results, with the knowledge and the skill to ensure good training of surgical practitioners. Analyze evidence base, survival table, data base, inflammatory response and good surgical practice.

B5. Appraisecomplications of surgery in immune-compromised patient and principles of ICU. Analyze different anatomical regions, surgical anatomy, and pathophysiology and apply this knowledge on anatomical models. Predict post-operative surgical complications in immune-

compromised patient. Explain methods of positioning patients during different surgical techniques. Appraise surgical audit and distinguish theater problem.

B6. Categorize complications and plan treatment of portal hypertension and appraise the mesentery and omentum. Analyze data gathered from assessment of breast cancer patient and use them to modulate screening programs for breast cancer. Examine the clinical and investigational results of GERD patient. Examine clinical finding of patients with skin, soft tissue, testicular and scrotal tumors. Distinguishsurgery of groin, femoral hernia, the abdominal wall and peritonitis.

B7.Categorize complications of intestinal obstruction, fistulae and propose management of each. Appraise problems of intestinal stomas and modulate life style of patient to cope with it. Analyze pelvic floor disorders and predict surgical complications for anal fissures, fistula & piles. Categorize complications of peptic ulcer, inflammatory bowel diseases and to differentiate upper & lower GIT bleeding. Distinguish management of caner stomach, colon and rectum.

B8. Categorize complications of obstructive jaundice and propose management of each. Analyze problems of pancreatitis (acute and chronic) and pancreatic fistula and tumors. Examine the clinical and investigational results, with the knowledge and the skill to reach accurate diagnosis of lymphoma and splenic disorders. Appraise post-operative complications after pancreatic and liver surgery. Distinguish complications of cholecystitis and different types of cholecystectomy.

B9. Categorize complications of burns and propose management of each and Analyze data gathered from assessment of grafts and flaps and face injuries. Appraise complications of soft tissue sarcoma. Examine clinical and investigational results of lower limb ischemia, diabetic foot, varicose veins and endovascular. Analyze different types of neck swellings, thyroid cancer and thyrotoxicosis. Distinguish complications of cancer bladder, prostate, urinary tract injuries and stones

B10. Appraise different types of experimental design. Differentiate types of equipment & laboratory facilities. Distinguish different techniques to ensure successful micro vascular anastomosis.

B11. Categorize complications of kidney transplantation and propose management of each. Compare the clinical and investigational results, with the knowledge and the skill to ensure successful kidney transplantation.Analyze data gathered from organ donation- laboratory techniques & donor-recipient match. Interpret the role of donor-recipient match in the success of transplantation in human beings. Distinguish complications of immunosuppressive drugs. Analyze the management of complications of immunosuppressive drugs. Appraise knowledge about assessments for experimental transplantation and about the immune system.

B12. Categorize complications of laparoscopic surgery and try to find solutions. Analyze advantages of laparoscopic surgery. Examine utility of laparoscopic repair of inguinal, ventral and incisional hernias. Appraise of different procedures for appendix, cholecystectomy,cholangiography, CBD exploration, examination of pelvis and abdomen, and abdominal exploration in malignancy.Analyze causes of malpractice in laparoscopic surgery and propose solutions.

c- Professional and practical skills:

C1.Apply main rules of ethics and legacy in Experimental Surgery.Apply main strategies to optimize experimental design and demonstrate laparoscopic procedures in animals and animal as a training model.
C2.Apply main strategies to optimize operative facilities, anesthesia facilities and post-operative intensive care facilities.Monitor theater problems and ICU. Practice position techniques in surgery.
C3.Demonstrate the effectiveness of experimental models in management of portal hypertension.Apply plan of management of portal hypertension patient.
C4.Apply main strategies to optimize pre- and post-operative management of immune-compromised patient ongoing surgery.
C5. Apply main strategies to optimize management and follow up of GERD patient.
C6. Illustrate the effectiveness of surgical management of breast cancer patient
C7. Demonstrate surgery for groin, femoral hernia, the abdominal wall and peritoneum, mesentery and omentum.Apply main strategies to optimize surgical management of cancer stomach, cancer rectum and cancer colon.Solve problems of intestinal stomas, obstruction and upper, lower GIT bleeding.
C8.Illustrate management of peptic ulcer disease and complicated inflammatory bowel diseases.Practice effectively surgery of gall bladder and liver tumors, abscess and cysts.Demonstrate complications of biliary strictures and apply new strategies of treatment.
C9. Apply main strategies to perform micro vascular anastomosis using specialized instruments and a high-quality microscope. Illustrate the skills necessary to connect ultra-small vessels and neural structures successfully requiring commitment and practice to refine.Practice micro vascular anastomosis. Employ post-operative precautions that must be kept to ensure success of anastomosis.Employ various equipment in lab and use the experimental design as a template in training on micro vascular anastomosis.
C10. Choose the immunosuppressive drug of choice to minimize the risk of allograft rejection.
C11. Apply main strategies to optimize laparoscopic biliary surgery: laparoscopic cholecystectomy, cholangiography and CBD exploration.Illustrate the results of peritoneal adhesions and tissue healing.
C12. Practice wide use of laparoscopy in managing inguinal, ventral and incisional hernias,appendicitis and intestinal disorders and in abdominal malignancies.

d- General and transferable skills:

D1. Communicate effectively using scientific language and reasoning.
D2. Work effectively and cooperatively in a team.
D3. Maintain an open and questioning mind toward ideas and alternative points of view.
D4. Understand the cumulative nature of scientific knowledge. Write patient records and properly present them

3- Academic standards

3a External references for standards (Benchmarks)

Generic Academic Reference Standards if 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 for master in experimental surgery
A1-Basic facts , theories, of the specialty and related subjects/ fields	A1 Recognize the basic aspects of experimental surgery, and become familiar with common and important surgical conditions.
A2-Mutual relation between professional practice and effects on environment	A5 Clarify the methods of cancer screening, early cancer detection and recognize risk groups.
A3-Recent advances in the field of practice	A4 Explain the operative details of surgical operations, different laparoscopic techniques and experimental surgical methods.
A4-Details of ethical & legal practice	A2 Identify the legal and ethical aspects of surgical practice.
A5 -Quality standards of the practice	A3Describe the etiology, pathogenesis, clinical features, complications, and management of common and important surgical conditions. The students have many opportunities for discussing important and common surgical problems with the teaching staff.
A6- Design, conduction & publishing of scientific research	A4 Explain the operative details of surgical operations, different laparoscopic techniques and experimental surgical methods.
A7- Ethical considerations in different types of scientific research	A2 Identify the legal and ethical aspects of surgical practice.
B1- Analyze, deduce, extrapolate & evaluation of information	B4Analyze the results of clinical and investigatory findings to formulate an appropriate diagnosis.
B2- Solve the majority of problems in the specialty according to the available data (complete or incomplete)	B5Plan management strategies for surgical diseases and to monitor the effectiveness of therapy and re-evaluate management plan accordingly
B3- Conduct research studies that add to the existing specialty knowledge	B4Analyze the results of clinical and investigatory findings to formulate an appropriate diagnosis.

B4- Publish scientific articles/papers (in indexed journals)	B7 Identify different cancer screening programs and the implication of early cancer detection in reducing cancer mortality and life style modification.
B5- Plan and implement (or supervise implementation of) enhancement & Improvement approaches to practice	B3 Select the appropriate investigations needed for diagnosis and management of surgical patient.
B6- Take decisions in various professional situations (including dilemmas & controversial issues)	B5 Plan management strategies for surgical diseases and to monitor the effectiveness of therapy and re-evaluate management plan accordingly
B7- Add to the specialty field through creativity & innovation	B6Developing experience in managing different surgical complications and follow up of these patients to evaluate the success of management.
B8- Manage discussions on basis of evidence and proofs	B1 Interpret patients' symptoms and physical signs in terms of their anatomic, pathologic and functional diagnostic significance.
C1- Competent in all basic and all required advanced professional skills (to be determined according to the specialty board/ department)	C1Improve the clinical skills and decision making which influence the management of patients.
C2- Write and appraise reports	C2 Identify basic and advanced different operative techniques to improve surgical training skills.
C3-Evaluate and improve methods and tools used in specialty	C3 Develop skills in interpreting radiological findings of various surgical diseases.
C4-Use technology to advance practice	C4 Gain advanced practical skills through experimental surgical researches
C5- Plan professional development courses to improve practice and enhance performance of juniors	C3 Develop skills in interpreting radiological findings of various surgical diseases.
D1- Communicate effectively using all methods	D1 Establish professional relation with patients, their families, and the community.
D2- Use information technology to improve his/her professional practice	D2 Conduct reliable and responsible behaviors.

D3- Teach and evaluate others	D4 Communicate effectively with other health care providers and work co-operatively in a team.
D4- Perform self-appraisal& seek continuous learning	D5 Discuss professional errors in an honest way.
D5- Use different sources of information to obtain data	D6 Assess the relevance and importance of the ideas of others.
D6- Work in teams as well as a member in larger teams	D6 Assess the relevance and importance of the ideas of others.
D7- Manage scientific meetings and appropriately utilize time	D5 Discuss professional errors in an honest way.

4- Curriculum structure and contents

4.a program duration: 3-5 years

4.b program structure : 30credit hours + 8 thesis

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

Semester	Core Courses	Elective Courses
	No. of hours	**No. of hours**
First semester	**(1714701-702-703) 6 credit hours**	
Second semester	**(1709740-1714705) 6 credit hours**	**2 credit hours**
Third semester	**(1714704-1714706) 6 credit hours**	
Fourth semester	**(1714707-1714708) 8 credit hours**	**2 credit hours**

4.b.ii- No. of credit hours **Lectures** 15 **Clinical** 15 **Total** 30

Compulsory 26 **Elective** 4 **Optional** 0

4.b.iii- No. of credit hours of basic science courses **No.** 2 **%** 7

4.b.iv- No. of credit hours of courses of social sciences **No.** 0 **%** 0

and humanities.				
4.b.v- No. of credit hours of specialized courses	**No.**	**28**	**%**	**93**
4.b.vi- No. of credit hours of other courses	**No.**	**0**	**%**	**0**
4.b.viiField Training	**No.**	**0**	**%**	**0**

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(26 credit hours)

Code No.	Course Title	No. of credit hours	No. of hours /week	
			Lecture	Clinical
1714701	Basic Consideration Experimental Surgery	**2**	**1**	**1**
1714702	Fundamental Experimental surgery	**2**	**1**	**1**
1714703	Basic Applied Surgery	**2**	**1**	**1**
1709740	Basics Laboratory Animal Science	**2**	**1**	**1**
1714705	Advanced surgery I	**4**	**2**	**2**
1714704	Fundamental in Applied Surgery	**2**	**1**	**1**
1714706	AdvancedSurgery II	**4**	**2**	**2**
1714707	Advanced Surgery III	**4**	**2**	**2**
1714708	Advanced Surgery IV	**4**	**2**	**2**

5.2- Elective I (4 credit hours)

Code No.	Course Title	No. of credit hours	No. of hours /week	
			Lecture	Clinical
1714711	Laparoscopic Surgery I	**2**	**1**	**1**
1710720	Pathology	**2**	**1**	**1**
1714709	Experimental Microvascular Surgery	**2**	**1**	**1**
1714710	Experimental Transplantation	**2**	**1**	**1**

5.3- Elective II – (none)

5.4- Optional – (none)

6- Program admission requirements

Graduate students with an M.B.Ch.B. of Medicine.

7- Regulations for progression and program completion

For the progression and completion of the program to obtain the degree of master of experimental surgery, the student must:

1. Complete38 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 one external examiners.

8- Evaluation of Students enrolled in the program.

Tool evaluation	Intended learning outcomes being assessed
Written	ILOs a &b
Clinical	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	Prof Mohamed Amin Saleh
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

Program coordinator:
Name: Medhat Anwar Signature: …….

Department Head:
Name: Ahmad Saad Signature: …….

Date of Department Council Approval: 6/9/2017

Program Aims vs ILOs matrix

program aims	1	2	3	4	5	6	7	8	9	10	11	12
ILOs												
a1	x											
a2		x										
a3			x									
a4				x								
a5					x							
a6						x						
a7							x					
a8								x				
a9									x			
a10										x		
a11											x	
a12												X
b1	x											
b2		x										
b3			x									
b4				x								
b5					x							
b6						x						
b7							x					
b8								x				
b9									x			
b10										x		
b11											x	
b12												X
C1		x										
C2			x									
C3				x								
C4					x							
C5						x						
C6							x					
C7								x				
C8									x			
C9										x		
C10											x	
C11												X
C12	x											
d1	x	X	x	x	x	x	x	x	x	x	x	X
d2	x	x	x	x	x	x	x	x	x	x	x	X

d3	x	x	x	x	x	x	x	x	x	x	x	
d4	x	x	x	x	x	x	x	x	x	x	x	X

Courses vs Program ILOs matrix

COURSES	1709740	1714701	1714702	1714703	1714704	1714705	1714706	1714707	1714708	1714709	1714710	1714711
ILOs												
a1	x											
a2		x										
a3			x									
a4				x								
a5					x							
a6						x						
a7							x					
a8								x				
a9									x			
a10										x		
a11											x	
a12												X
b1	x											
b2		x										
b3			x									
b4				x								
b5					x							
b6						x						
b7							x					
b8								x				
b9									x			
b10										x		
b11											x	
b12												x
C1		x										
C2			x									
C3				x								
C4					x							
C5						x						
C6							x					
C7								x				
C8									x			
C9										x		
C10											x	
C11												x
C12	x											
d1	x		x		x	x	x	x			x	x

d2		x		x	x		x	x	x	x		x
d3	x	x	x	x	x		x		x	x	x	
d4	x	x	x	x		x		x	x	x	x	x
d2			x				x		x			x
d3				x		x				x	x	

ARS vs ILOs matrix

ARS	A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	B7	B8	C1	C2	C3	C4	C5	D1	D2	D3	D4	D5	D6	D7
ILOs																												
a1	x		x		x		x	x		x		x	x			x	x		x		x	x	x		x			x
a2		x	x			x		x			x			x	x		x			x			x			x	x	
a3																												
a4		x		x	x		x		x	x		x		x		x		x	x		x	x		x		x		x
a5	x		x			x		x			x		x		x		x			x			x		x		x	
a6	x			x					x				x			x		x				x		x	x			x
a7	x			x		x	x		x		x	x	x			x		x		x	x	x		x	x			x
a8		x			x					x				x					x							x		
a9			x					x							x		x						x				x	
a10					x		x			x		x							x		x							
a11		x				x					x			x						x						x		
a12	x			x	x				x	x			x			x		x	x			x		x	x			x
b1			x				x	x				x			x		x				x		x				x	
b2				x		x			x		x					x		x		x		x		x				x
b3		x	x					x						x	x		x						x			x	x	
b4	x												x												x			
b5				x	x		x		x	x		x				x		x	x		x	x		x				x
b6		x				x					x			x						x						x		
b7	x		x					x					x		x		x						x		x		x	
b8					x					x									x									
b9		x		x			x		x			x		x		x		x			x	x		x		x		x
b10						x					x									x								
b11	x		x	x				x	x				x		x	x	x	x				x	x	x	x		x	x
b12							x					x									x							
C1		x		x	x				x	x				x		x		x	x			x		x		x		x

C2	x												x												x				
C3			x		x		x	x		x		x			x		x		x		x		x					x		
C4	x		x		x			x		x			x			x	x		x			x	x		x			x	
C5			x		x		x	x		x		x			x		x		x		x		x					x		
C6																														
C7		x		x	x	x			x	x	x			x		x		x	x	x		x		x		x		x	
C8	x						x					x	x									x				x				
C9			x			x		x			x				x		x			x			x					x		
C10				x	x				x	x						x		x	x			x		x					x	
C11		x				x					x			x						x							x			
C12	x					x	x				x	x	x							x	x				x					
d1			x		x			x		x					x		x		x				x					x		
d2			x		x		x	x		x		x			x		x		x		x		x					x		
d3		x		x					x					x		x		x				x		x		x		x		
d4	x				x		x			x		x	x						x		x				x					

Teaching methods vs Course matrix

	1714701	1714702	1714703	1709740	1714704	1714705	1714706	1714707	1714708	1714711	1710720	1714709	1714710
Lecture	x	x	x	x	x	x	x	x	x	x	x	x	x
Clinical	x	x	x	x	x	x	x	x	x	x	x	x	x
Brainstorming	x			x				x			x		
Discussion Groups		x	x			x			x		x	x	
Problem Solving			x		x		x			x			x
Case Study						x	x	x	x			x	
Field Training													
Role playing							x						
Training Workshops										x			
Self-Directed Learning	x	x		x	x	x							
e-learning													
Project								x					