Republic of Yemen
Ministry of Higher Education & Scientific Research
21 September University for Medical & Applied Sciences
Faculty of Laboratory medicine
Department of Hematology

الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر للعلوم الطبية والتطبيقية
كلية الطب المخبري
قسم الدم

21 September University for Medical & Applied Sciences

Faculty of Laboratory Medicine

Program Specifications

Master's Degree

of

Medical Hematology

Code: 03.03

2022/2023

Prepared by:	Reviewed by:	Head of the Department:	Quality Assurance:	Dean
Dr. Bushra al absi	Dr. Nawal alhenhena	Dr. Bushra al absi	Dr. Gamil N. Abdu Mughni	Prof. Dr. Ebtesam Al-Zabedi

Content

Program Specification

1- Program Identification and General Information:

Program Identification and General Information:		
1	Program title:	Master's degree in Medical Hematology
2	Department responsible for the program:	Department of Hematology
3	Degree offered	Master of Medical Hematology
4	The Institute responsible for granting the degree:	21 September University of Medical & Applied Sciences
5	Study system:	Single
6	Study language of the program:	English
7	Entry requirements:	Bachelor's degree in Laboratory Medicine or other equal degrees
8	Departments participating in the program:	Department of Hematology Faculty of Laboratory Medicine
9	Starting year of the program:	2022-2023
10	Study methods in the program:	Lectures, Seminars, Lab Training, Discussion, Presentations, Self-learning Case study
11	Location of delivery:	21 September University of Medical & Applied Sciences, Faculty of Laboratory Medicine, Department of Hematology
12	The program resources:	21 September University of Medical & Applied Sciences
13	Minimum grade requirements:	As per regulations of the Ministry of Higher education and Scientific Research
16	Other admission requirements:	According to the University rules and regulations
14	Date of current development of the program:	January 2023
15	Prepared by:	- Prof. Dr. Mojahed Ali Measar - Prof. Dr. Khaled A. Al-Moyed - Associate Prof. Dr. Ebtesam Al-Zabedi - Assistant Prof. Dr. Gamil Taher Abdul-Mughni - Assistant Prof. Dr. Nawal Alhenhena - Assistant Prof. Dr. Boshra Al-absi
16	Program coordinator:	Assistant Prof. Dr. Gamil Taher Abdul-Mughni

Mission, Objective, and Learning Outcomes of the master program
I. Mission:
To prepare highly qualified graduate skilled in the Medical Hematology through advanced leaning, practices and conducting scientific research.
II. General objectives of the program:
1- Produce health science professionals and in-depth medical hematology knowledge of blood science and its disorders.
2- Provide our candidate with the ability to apply different techniques in the field of medical hematology and blood transfusion.
3- Provide opportunities to gain research capacity and publish scientific relevant studies.
4- Promote community partners and stakeholders for program development, evaluation and improvement and active participation in professional societies.
III. Graduate Attributes of the program
Upon successful completion of the program in Master of Medical Hematology, the graduates will be able to:
1. provide an advanced knowledge in the fields of Medical Hematology and blood transfusion.
2. provide independent critical and analytical thinking, both within their field of study, and beyond for the use of their knowledge for service to others.
3. suggest possible solutions to ethical dilemmas that occur in their work and field of study and understand the importance of professional ethics in all aspects of scientific communication and laboratory work.
4. demonstrate competence in the laboratory, including application of the scientific method and appropriate use of basic and state of the art laboratory tools and techniques.
5. demonstrate written and oral skills necessary for communication of research, knowledge, and ideas to scientists and non-scientists alike.

3. Intended Learning Outcomes from the program:	
A. Knowledge and understanding:	
At the end of the course the student should be able to	
1	**Understand** the advanced knowledge about the cellular biology both in the normal development of hematopoietic stem cells and hematological malignancies.
2	**Understand** the presentation, complications, diagnosis and management of different types of anemia, acute and chronic leukemias, pathophysiology and classification of myeloproliferative disorders, congenital and acquired coagulation and platelet disorders.
3	**List** the key considerations and principles in the planning and design of a study on the basis of statistical methods.
4	**Understands** the required laboratory tests used in the diagnosis of blood disorders.
5	**Explain** the use of blood products, the principles of blood transfusion and the complications of long-term transfusion.
6	**Understand** of blood and its production from a molecular/genetic perspective.
B. Intellectual Skills:	
At the end of the course the student should be able to	
1	**Interpret** and explain results simply and effectively to clinicians and patients
2	**Illustrate** an investigatory and analytic thinking approach (problem solving) to common clinical situations related to medical hematology.
3	**Categorize** health risk factors associated with working in a research diagnostic laboratory
4	**Formulate** management plans and alternative decisions in different situations in the field of the medical hematology.
C. Professional and Practical Skills:	
At the end of the course the student should be able to	
1	Evaluate the peripheral blood and bone marrow aspirate smears.
2	Perform all aspects of testing within hematology laboratory and blood bank.
3	Interpret, verify and validate results and report findings to the requesting clinician.
D. General and Transferable outcomes:	
At the end of the course the student should be able to	
1	**Communicate** effectively through oral presentations, computer processing and presentations, and written reports.
2	**Respect** the role of staff and co-staff members regardless of degree or occupation.
3	**Write** scientific article according to the basics of scientific research

Program Standards & Benchmarks
Academic Standards:
-NARS (National Academic References Standard) for medical education in Yemen
-Academic Standards Curriculum Criteria of Accreditation Board
-Unified Regulations for Student Affairs, Ministry of Higher Education and Scientific Research
Benchmarks
1-Faculty of medicine and health Sciences, Sana'a university, Yemen
2- Jordan University of Science and Technology (JUST), Jordan https://www.just.edu.jo/FacultiesandDepartments/FacultyofGraduateStudies/Documents/Master%20Degree%20in%20Hematology%20and%20Blood%20Banking.pdf
3- Arab American University, Palestine https://www.aaup.edu/ar/Academics/Graduate-Studies/Faculty-Graduate-Studies/Health-Sciences-Department/Master-Immunohematology/Thesis-Track-Curriculum
4- Manchester Metropolitan University, UK https://www.mmu.ac.uk/study/postgraduate/course/msc-haematology-and-transfusion-science-1/
5- University of Westminster, London, UK https://www.postgraduatesearch.com/courses/search/postgraduate/university-of-westminster-london/biomedical-sciences-haematology-msc/52355974
6- Middlesex University, London, UK https://www.mdx.ac.uk/courses/postgraduate/biomedical-science-haematology-and-transfusion-science

Teaching and Learning Strategies:
• Lectures • Seminars • Lab experiments • Training • Discussion • Presentations • Self-learning • Case study

Teaching strategy:	
Teaching Strategy	Description of how it will be used
Lectures	It is the most frequently employed teaching method to convey knowledge and explain theories to students in large groups or in sessions, which consist of more than one group gathered in one classroom.
Seminars	These are mainly used with small groups of students in which they find better chances for discussing and negotiating the different concerns of their studies.
Lab experiments	Students doing practices in medical labs individually or in small groups.
Training	This is a practical kind of course where the students are required to plan and execute some field visits to hospitals, corporations or institutions where the process of clinical pharmacy is essential.
Discussion	This is done by allowing the students to ask questions during the lecture and respond to them by the lecturer or other students for the purpose of establishing and clarify the subject of the lecture strongly and increase the concentration and absorption of the student and the attention and not to enter the boredom.
Presentations	Helps the students to be more confident with themselves and make them to show the others what knowledge they have acquired. It can be followed in many types of courses and tasks.
Self-learning	Self-learning is the process by which learners teach themselves using any materials or resources to achieve clear goals without the direct help of the teacher
Case study	Case studies are defined as the scientific documentation of a single clinical observation which is so important study design in advancing medical scientific knowledge especially of rare disease.
Office Hours	Office hours are hours determined by the faculty member (professor of the course) to which the student studies. The hours allocated by the professor to meet with his students to help them and answer their queries in the event of any questions they may not be enough time for the lecture to answer it.

Assessment Methods:
• Written examinations • Oral exams • Technical or practical reports /Presentations • Assignments including problem-solving exercises • Individual and group project work • Quizzes • Homework

Assessment Strategies:	
Assessment Strategy	Its description (in which course it will be used and in which rate)
Written examinations	Mid-term test is conducted between 6th to 8th Class and final exam is conducted at the end of each course
Oral exams	For selected courses
Technical or practical reports /Presentations	As indicated in the course specification
Assignments including problem-solving exercises	The entire assignments including problem-solving exercises of coursework activities during the teaching period of each course. (Which includes group and individual work, tests and presentations, etc.)
Individual and group project work	As indicated in the course specification
Quizzes	For all courses except for project
Homework	For all courses except for project

1. Alignment of Program Intended Learning Outcomes (PILOs) to Teaching Strategies and Assessment Methods:		
PILOs	**Teaching Strategy**	**Assessment Methods**
Knowledge and Understanding A1, A2, A3, A4, A5	Lectures, Interactive class discussions, Tutorials.	Written exams, assignment work, quizzes, submission of reports.
Intellectual Skills B1, B2, B3, B4, B5	Lectures, Tutorial, Interactive class discussions, and group work, presentation.	Written exams, Project, Case studies and assignment work.
Professional & practical skills C1, C2, C3	Short lectures, case study, Laboratory experiments, Project, and group work, Field training.	Written exams, quizzes, Practical exam assignment and report submission.
General & Transferable Skills D1, D2, D3	Group work, Self-study, Interactive class discussions, Tutorials, Seminar/ project/presentation, Laboratory experiments, Project.	Project presentation, Laboratory exam, Report/Project

1. **Project Assessment:**	
Each project will be assessed by a committee of three members as follows:	
Item	**Marks Distribution**
Project supervisor	60%
Internal examiner: a member of the department staff.	20%
External examiner: a qualified external examiner (either from other departments of the faculty or from another university)	20%
Total	**100%**

Program Structure and Contents

Study System	
I- Duration of program	2 – 3 years, maximum 4 years divided into courses, training and thesis
II- Structure of the program:	Total contact number of credit hours 33
First year	Program-related essential courses and Students ILOs
Thesis	MSc thesis subject should be officially registered within 3 months after the second semester of the program, discussion and acceptance of the thesis could be set after 12 months from MSc thesis registering date.

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Program course:

	Course Compulsory	**code**	**Credits hours**
1	Advanced Hematology I (Stem Cells and Hemopoiesis)	03.13.311	2
2	Advanced Hematology II (Red Blood Cell Disorders)	03.13.312	3
3	Advanced Hematology III (Hemostasis and Thrombosis)	03.13.313	3
4	Advanced Hematology IV (Hematological Malignancies)	03.13.314	3
5	Advanced Diagnostic Hematology	03.13.315	2
6	Advanced Immunohematology and Blood Transfusion	03.13.316	2
7	Cellular and molecular biology	03.13.317	3
8	Biostatistics and epidemiology	03.13.318	2
9	Research Methodology	03.13.319	2
10	Advanced Biochemistry	03.13.320	2
11	Advanced genetics of hematology	03.13.321	2
12	Medical laboratory training		
	Thesis		6
	Total		33

Study Plan

Distribution of Courses according to Semesters (33 credit hours)

	1- First semester	Code	Credit Hour	Number of weeks
1	Advanced Hematology I (Stem Cells and Hemopoiesis)	03.13.311	2	16
2	Advanced Hematology II (Red Blood Cell Disorders)	03.13.312	3	16
3	Advanced Immunohematology and Blood Transfusion	03.13.316	2	16
4	Cellular and molecular biology	03.13.317	3	16
5	Biostatistics and Epidemiology	03.13.318	2	16
6	Advanced Biochemistry	03.13.320	2	16
	Total		**14**	

	2- Second semester	Code	Credit Hour	Number of weeks
1	Advanced Hematology III (Hemostasis and Thrombosis)	03.13.313	3	16
2	Advanced Hematology IV (Hematological Malignancies)	03.13.314	3	16
3	Advanced Diagnostic Hematology	03.13.315	2	16
4	Research Methodology	03.13.319	2	16
5	Advanced genetics of hematology	03.13.321	2	16
6	Medical laboratory training		1	16
	Thesis		6	
	Total		**19**	

Annex-1, Program Structure:

No.	Requirements		No. of Courses	Credit Hours	Rational Weight %
1	Program Requirements	Compulsory	13	24	80
		Elective	0	0	0
2		Thesis	1	6	20
	Total:		14	30	

Annex-2, Academic Standards Curriculum Criteria of Accreditation board.

	Academic Standards:
1	NARS for medical education in Yemen
2	Annex- 2, Academic Standards Curriculum Criteria of Accreditation Board
3	Annex- 3, Unified Regulations for Student Affairs, Ministry of Higher Education and Scientific Research

Annex-3, Alignment Program vision, mission and Objectives with University and Faculty

	University	Postgraduate studies and scientific research	Faculty of laboratory Medicine Vision, Mission and Goals:	Hematology
Vision	A contemporary university with national responsibility and a faith identity	Scientific research and contemporary postgraduate studies according to quality standards that meet the needs of the labor market locally and regionally	Contemporary and competitive faculty in Laboratory medicine.	
Mission	Leading the transformation in the management and delivery of health care with all partners by setting a standard of excellence in education and medical and applied research in a way that meets the needs of Yemeni society, its privacy and regional influence.	to prepare and implement scientific programs Qualitative application in order to prepare distinguished research leaders that contribute to the treatment of Community problems.	Contribute to improving health services in laboratory medicine by achieving standards of excellence in education and scientific research in a way that meets the needs and privacy of society and contributes to addressing global health problems.	To prepare highly qualified graduate skilled in the medical Hematology through advanced learning, practices and conducting scientific research.

Objectives	1. Ensuring the application of quality standards and setting standards of excellence in medical and applied sciences, scientific research and community service. 2. The centrality of the student in the educational process, the partnership with them for life, the consolidation of the principles of national responsibility and faith identity, their care and the development of their capabilities after graduation and during work. 3. Attracting, employing and retaining scholars, cadres and highly specialized talents to gain minds and reverse the trend of "brain drain" in a way that enhances and ensures the creation of thinkers, businessmen and good citizens.	1-Establishing quality postgraduate programs that attract local and regional university graduates 2- Continuous development and updating of postgraduate programs in accordance with comprehensive quality standards 3- Preparing distinguished researchers through continuing education programs and developing research skills. 4- Partnership with similar scientific institutions in scientific research. 5- Developing the infrastructure, human and financial for graduate studies programs and scientific research in accordance with the standards of academic accreditation.	1. Preparing a highly qualified and skilled cadre in the field of laboratory medicine. 2. Building an educational system that keeps pace with development and conforms to academic quality standards. 3. Adopting, supporting and investing scientific research programs to meet the requirements of sustainable development and to contribute to solving global health problems. 4. Developing a culture of community partnership in the field of laboratory medicine and research.	1- Produce health science professionals and in-depth medical hematology knowledge of blood science and its disorders. 2- Provide our candidate with the ability to apply different techniques in the field of medical hematology and blood transfusion. 3- Provide opportunities to gain research capacity and publish scientific relevant studies. 4- Promote community partners and stakeholders for program development, evaluation and improvement and active participation in professional societies.

	4. Continuous development of the distinguished academic infrastructure and the establishment of modern research and service centers with high efficiency and capable of making a real impact locally and regionally. 5. Enhancing the university's position as a preferred partner for local, regional and international partnership through implementing innovative models of education, exchanging research and knowledge and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally	6- Automating the system of postgraduate studies and scientific research and activating electronic links. 7- Attracting expertise from faculty members and researchers from the internal and external environment.	5. Enhancing the facility position as a preferred partner for local, regional and international partnership through implementing innovative models of education, exchanging research and knowledge and providing real and effective outcomes for developing professional practices to benefit from them locally and regionally.	

Annex-4, Survey of Credit Hours of Similar Programs

Benchmarking		21 UMAS	Sana'a university	Jordan University of Science and Technology (JUST)	Arab American University. AAU	Manchester Metropolitan University	University of Westminster	Middlesex University
Program Requirements	Credit Hours	24	30	16	24	100	80	120
	Percentage	80	83	47	67	56	67	67
Program Electives	Credit Hours	0	0	9	6	0	0	0
	Percentage	0	0	26	17	0	0	0
Program Thesis	Credit Hours	6	6	9	6	80	40	60
	Percentage	20	17	26	17	44	33	33
Total Credit Hours		30	36	34	36	180	120	180

Annex-5, Survey on Mission and objectives of the program and Similar accredited program.

University	21 UMAS	Sana'a university	Jordan University of Science and Technology (JUST)	Arab American University. AAU		
Faculty	Laboratory Medicine	Medicine and Health Sciences	Faculty of Graduate Studies	Faculty of Graduate Studies		
Department	Hematology	Hematology	_____	Health Sciences		
Program degree	Medical Hematology	Laboratory Hematology and Blood Transfusion	Medical Laboratory Sciences/Hematology and Blood Banking	Immunohematology		
Country	Yemen,	Yemen,	Jordan	Palestine		

Program Mission	To prepare highly qualified graduate skilled in the medical hematology through advanced practical and conducting scientific research.	to contribute to improve health in Yemen, through the pursuit of excellence in research, postgraduate teaching, and advanced training				
Program Objectives (PObj)	1- Produce health science professionals and in-depth medical hematology knowledge of blood science and its disorders. 2- Provide our candidate with the ability to apply different techniques in the field of medical hematology and blood transfusion.					

	3- Provide opportunities to gain research capacity and publish scientific relevant studies. 4- Promote community partners and stakeholders for program development, evaluation and improvement and active participation in professional societies.					

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Annex-6, Alignment Program Intended Learning Outcomes (PILOs) to Faculty Educational Objectives (FObj).

1. Program PILOs	Objectives				
	FObj1	FObj2	FObj3	FObj4	FObj5
A1	√	√	√	√	√
A2	√	√	√	√	√
A3	√	√	√	√	√
A4	√	√	√	√	√
A5					
B1	√	√	…	√	√
B2	√	√	…		
B3	√	√	…		
B4	√	√	√		
B5	√	√	√	…	
C1	√	√	√	…	
C2	√	√	√	…	
C3	√	√	√		√
D1	√	√	√		√
D2	√	√	√		√
D3	√	√	√		√

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Annex-7, Alignment of Program Intended Learning Outcomes (PILOS) to Program Objectives (POs)

1. Program PILOs	Program Objectives					
	POb j1	POb j2	POb j3	POb j4	POb j5	POb j6
A1	√	√	…	…	√	
A2	√	√	…	√	√	
A3	√	√	√	√	√	√
A4	√	√	√	√	√	√
A5	√	√	…	√	√	√
B1	√	√	…	√		√
B2	√	√	…	√		√
B3	…	√	√	√	√	√
B4	√	√	…	…	√	√
B5	…	…	…	…	√	√
C1	…	…	…	√	√	√
C2	√	√	…	√		
C3	√	√	√	√	√	√
D1	√	√	…	√	√	√
D2	√	√	√	√	√	√

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Annex-8, Survey of Course Names per Academic Semesters of Similar Programs

University	21UMAS	Sana'a university	Jordan University of Science and Technology (JUST)	Arab American University. AAU			
No of Courses	14	17	12	13			
Total Cr. Hrs.	30	36	34	36			

Level 1

Semester	No	Course Name	CH	Course Name	CH	Course Name	CH	Course Name	CH			
1	1	Advanced Hematology I (Stem Cells and Hemopoiesis)	2	Advanced Medical Laboratory Instrumentation and Automation	1	Advanced Biochemistry	3	Advanced Clinical Hematology I	3			
	2	Advanced Hematology II (Red Blood Cell Disorders)	2	Medical Biochemistry	2	Advanced Molecular Biology	2	Advanced Lab. Quality Management in Immunohematology	2			
	3	Advanced Hematology III (Hemostasis and Thrombosis)	2	Advanced Molecular Biology	2	Advanced Medical Microbiology	3	Advanced Immunology	3			
	4	Advanced Immunohematology and Blood Transfusion	2	Advanced Medical Hematology I (Hematopoiesis and Hemoglobin)	2	Advanced Hematology	2	Advanced Clinical Biochemistry	3			

	5	Advanced Molecular Biology I	2	Advanced Medical Hematology II (Red Cell Disorders)	2	Advanced Clinical Laboratory Management	2	Advanced Clinical Hematology II	3			
	6	Advanced Biochemistry	2	Advanced Medical Hematology III (Platelets and Coagulation Disorders)	2	Seminar	1	Advanced Blood Banking and Immunohematology	3			
	7		2	Advanced Immunohematology and Blood Transfusion	2	Advanced Clinical Laboratory Training	1	Biomedical Statistics	3			
	8		Zero	Medical Physiology	1	Research Methods and Research Proposal	2	Molecular Laboratory Diagnosis	2			
	9		6	Seminar in Current Topics in Hematology and Blood Transfusion	1			Advanced Immuno-Hematology Practical Training	1			
	10							Advanced Clinical Hematology Practical Training	1			
2	1	Advanced Hematology IV (Hematological Malignancies)	2	Advanced Medical Hematology IV (Red Cell	2	Advanced Clinical	3	Microbial Pathogens and	3			

				Metabolism and Genetic Disorders)		Hematology I		Infectious Diseases				
	2	Advanced Diagnostic Hematology	2	Advanced Medical Hemato-oncology (White Cell Disorders)	3	Advanced Clinical Hematology II	3	Research Methodology and Scientific Writing	3			
	3	Advanced Molecular Biology II (Molecular Hematology)	2	Advanced Medical Laboratory Management and Quality Assurance	2	Advanced Immunohematology and Blood Banking	3	Bioinformatics	3			
	4	Advanced Bioanalytical Techniques and Automation	2	Research Methodology and Biostatistics	1	Special Topics in Hematology	3	Biomedical Ethics	3			
	5	Research Methodology and Biostatistics	2	Advanced Diagnostic Hematology Practical Training	3	Special Topics in Blood Banking	3	Special Topics in Hematology	3			
	6	General and Systemic Pathology	2	Advanced Diagnostic Immunohematology and Blood Transfusion Practical Training	3			Special Topics in Immunohematology	3			
	7	Medical laboratory training	Zero	Seminar in Current Topics in Hematology and Blood Transfusion	1			General And Systemic Pathology	3			
	8	Thesis	6	Thesis	6			Thesis	6			

Annex-9, Survey of Number of courses and Credit Hours of Similar Programs Compared to Current Program

University	No of Courses	Total Cr. Hrs.
21 UMAS	14	30
Sana'a university	17	36
Jordan University of Science and Technology (JUST)	12	34
Arab American University. AAU	13	36
Manchester Metropolitan University	10	180
University of Westminster	5	120
Middlesex University	9	180

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Annex-10, Matrix of Mapping Program PILO's with Courses

No.	Course	Code / No.	ILOS														
1	Advanced Hematology I (Stem Cells and Hemopoiesis)		Knowledge &understanding skills				Intellectual skills				Practical & professional skills				General &Transferable skills		
2	Advanced Hematology II (Red Blood Cell Disorders)		A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3
3	Advanced Hematology III (Hemostasis and Thrombosis)		x	x	x	x					x	X	x	x	x	x	x
4	Advanced Hematology IV (Hematological Malignancies)		x	x	x	x	x	X	x	x	x	X	x	x	x	x	x
5	Advanced Diagnostic Hematology		x	x	x	x	x	X	x	x	x	X	x	x	x	x	x
6	Advanced Immunohematology and Blood Transfusion		x	x	x	x	x	X	x	x	x	X	x	x	x	x	x
7	Advanced Molecular Biology I		x	x	x	x	x	X	x	x	x	X	x	x	x	x	x

8	Advanced Molecular Biology II (Molecular Hematology)		x	x	x	x	x	X	x	x	x	X	x	x	x	x	x
9	Research Methodology and Biostatistics		x	x	x	x	x	X	x	x	x	X	x	x	x	x	x
10	Advanced Biochemistry																
11	Advanced Bioanalytical Techniques and Automation		x	x	x	x	x	x	x	x	x	X	x	x	x	x	x
12	General and Systemic Pathology		x	x	x	x	x	x	x	x	x	X	x	x	x	x	x
13	Medical laboratory training		x	x	x	x	x	x	x	x	x	X	x	x	x	x	x
14	Thesis		x	x	x	x	x	x	x	x	x	X	x	x	x	x	x