



Program Specification of Master of Medicinal Chemistry

1. Program Introduction/Description

Master of medicinal chemistry is a thesis-based program which develops advanced knowledge and skills in medicinal chemistry focusing on various aspects of discovery, design, development, synthesis, structural elucidation and biological screening of pharmaceutical substances. It prepares a graduate to perform research in the study of drug discovery, design and development. The program prepares students for academic or research positions in universities, and industrial or government institutions. This program combines the study of theories and doing research on a range of medicinal chemistry field. The program is designed to prepare students to be leaders in the pharmacy and to provide them with the tools to effectively practice in senior research and teaching position in the field of discovery, design and development of new drug in research institutions, universities and enterprises. Students in this program study pharmacy-related specialized courses intensively and required to take specialized courses in medicinal chemistry and choose their research's fields and publish it in international journals.

2. Program Identification and General Information

Program Title	Master of Medicinal Chemistry
Total credit hours required to award the degree	36 credit hours
Awarding Institution	Faculty of Pharmacy, Sana'a University
Department	Medicinal, Pharmaceutical Organic and Analytical Chemistry
Other Departments with major Teaching Contributions	-
Language of study	English
Date of Specification Preparation/Revision	
Mode of Study	Courses and thesis
Study System	Full time-semester based
Main Location of Study	Faculty of Pharmacy
Mode of Delivery	Full time
Study Duration	Full-time (minimum 4 semesters)
Award(s) or Final Award	Master of Medicinal Chemistry
Qualification required to join the program:	- A bachelor's degree in Pharmacy from the Faculty of Pharmacy, Sana'a University or from any faculties of Pharmacy (Universities) recognized by Ministry of Education and Scientific Research in Yemen.
Minimum grade requirements to enroll in the program	-
Other admission requirements	- The student must pass English as a Foreign Language (TOEFL) with a condition of no less than 450 or its equivalent as a requirement for admission to the program.
Program coordinator:	Prof. Dr. Tawfeek A. Yahya.
Approval date:	



3. Program Curriculum Committee:

Prof. Dr. Tawfeek A. Yahya
Prof. Dr. Jalal H. Abdullah
Prof. Dr. Shada H. Yassin

4. Vision, Mission & Aims of the University

Vision of the University

Sana'a University aspires to achieve a national leading role in teaching, learning, scientific research and community service; and to be among the best regional universities and the foremost house of expertise and think tank in Yemen.

Mission of the University

To contribute to the sustainable development efforts by providing an accredited higher education environment and excellent research services within a fruitful national partnership based on transparency, professionalism and creativity.

Aims of the University

The University seeks to achieve the following objectives:

1. To provide specialized and in-depth academic opportunities for students in different fields of knowledge to meet the country's needs of specialists, technicians and experts, with a special focus on:
 - a) boosting the level and quality of education and qualification tasks.
 - b) Creating a general culture aiming at developing the elements of sound Islamic personality and the proper cognitive and scientific training.
 - c) Stabilizing the true Islamic vision emanating from the broad horizons of Islamic knowledge and its perception of the universe, man and life.
 - d) Developing innovative and critical scientific thinking skills.
 - e) Providing students with the required knowledge as well as scientific and practical skills for solving problems effectively and efficiently.
 - f) Enabling students to carry out, implement and assess scientific research methods.
 - g) Developing positive talents and skills towards working in general with special focus on promoting the spirit of cooperation, collective action, effective leadership, sense of responsibility and ethical commitment.
 - h) Developing positive attitudes towards science and technology, their rapid developments and how to utilize them for developing and solving problems of the Yemeni environment and society.
 - i) Developing the students' positive attitude towards the concept of self-learning and lifelong learning.
2. To cherish Arabic language, its teaching and development; and mainstream its use as the language of science and education in various arenas of knowledge, as a vehicle for cultural meanings, values and ethics of the Arab-Islamic civilization.
3. To develop knowledge through engaging in multidisciplinary research, both individually and collectively, and directing them towards serving the community needs and development plans.
4. To nurture the development of technology and its utilization in the community development.



5. To promote the activities of authorship, translation and publishing in various fields of knowledge with special emphasis on the Yemeni heritage.
6. To contribute to the promotion of arts, literature and the advancement of sciences.
7. To offer an academic atmosphere conducive to the freedom of thought, expression and publication in a way that does not contradict with the lofty values and elevated ideals of Islam.
8. To strengthen relations with universities and public and private institutions in the country to ensure a mutual and constructive interaction of knowledge, expertise, resources and participation that will guarantee effective contribution to the comprehensive development of the country.
9. To strengthen scientific and cultural ties with Arab and foreign universities, scientific bodies, and research and development centers, with a view to developing Sana'a University and enhancing its prominence.
10. To offer technical and specialized studies and consultations for various public and mixed-sector institutions.
11. To contribute to the development of policies and ways of work in institutions of both public and private sectors, providing models and innovative experiments to solve various problems.
12. To promote the efficiency of employees in public and private institutions and agencies, by contributing to the development of in-service preparation and qualification programs.

5. Vision, Mission & Aims of the Faculty

Vision of the Faculty

Excellence and leadership locally, regionally and globally, in providing knowledge and continuous education in the academic and research field in pharmaceutical sciences According to the markets needs and community services

Mission of the Faculty

The College of Pharmacy seeks to prepare scientifically and practically qualified pharmaceutical graduates with high professional ethics and able to compete locally, regionally and globally in providing healthcare services through educational programs in accordance with quality standards that can support national pharmaceutical industries, market needs and serve community.

Aims of the Faculty

1. Providing students with comprehensive knowledge about physiochemical properties and biological activities of medicinal substances required for formulating and preparing pharmaceutical products from their different sources, natural or synthetic.
2. Providing students with opportunities, practical skills, and training in different pharmaceutical sciences to ensure effective contribution in enhancing the requirements of pharmaceutical industries and labor market needs to serve the community.
3. Performing students the pharmaceuticals qualitative and quantitative analytical techniques according to GLP and GPMP guidelines to assess the quality and quantity of raw materials from natural or synthetic sources and different pharmaceutical products.
4. Possessing students the core knowledge concerning the principles of pathophysiology of diseases, pharmacotherapy, pharmacovigilance and Pharmacoeconomics to be able to



participate with other health care professionals in improving health care services using evidence-based
5. Planning, designing and conducting undergraduate and postgraduate research using appropriate methodologies.
6. Developing student's presentation, promotion, pharmaceutical marketing, administration, numeric and computation skills.
7. Demonstrating student's capability of communication skills, time management, critical thinking, problem-solving, decision-making and team-working.
8. Manage the safe and efficient distribution of medications and participate in quality assurance and improvement programs to maintain the sustainability of good practice.
9. Demonstrate a professional attitude through practicing in an ethical, legal manner and according to the GMP and GPP guidelines and continuously maintaining his/her competence through lifelong learning.

6. Mission & Aims of the Department

Mission of the Department

To prepare high professional, ethical, qualified pharmaceutical postgraduates who able to compete locally, regionally and globally in providing healthcare services through excellence education and research study in the field of analysis, and synthesis of raw materials and synthesis, analysis and designing of pharmaceutical compounds.

Aims of the Department

1. Possessing advanced knowledge and practical experience in simple and new methods for synthesis and analysis of raw materials used as starting material for designing and synthesis of pharmaceutical compounds.
2. Providing students with advanced principles and practical experience in modern methods and techniques of pharmaceutical analysis.
3. Enriching advanced knowledge and skills in medicinal chemistry focusing on design, synthesis and biological evaluation of pharmaceuticals.
4. Planning, designing and conducting pharmaceutical research using appropriate methodologies.
5. Perform research studies on specific pharmaceutical active compounds based on applying the scientific basis of research methodologies, ethics and professional practice.
6. Encouraging students for discovering and development of pharmaceutical active substances.
7. Demonstrating communication skills, problem solving, critical thinking and decision-making abilities in research field.
8. Comprehending reliably literature in the field research and developments of professionalism and long-life learning.
9. Interpreting the work results and information to solve problems.
10. Providing the student with knowledge and skills for writing reports and thesis and publishing papers.



7. Mission & Aims of the Program

Mission of the Program

Preparing qualified students with high professional ethics through innovative education and research study in the field of medicinal chemistry to meet the needs of the community healthcare locally and regionally.

Aims of the Program

1. Providing students with advanced knowledge regarding basics principles, theories, methods and skills of the scientific research in the field of Medicinal Chemistry.
2. Suggesting possible plan for designing scientific and systematic research proposals to study a specified problem in the field of Medicinal Chemistry
3. Applying appropriate scientific methodologies, ethical aspects and guidelines to carry out the experiments of the pharmaceutical research.
4. Developing skills for critically reviewing the scientific literature, writing reports/thesis and publishing papers.
5. Demonstrating problem-solving, making decision, critical thinking abilities as well as organization, time management skills during the research work.
6. Communicating efficiently with colleagues and coworkers.
7. Developing professionalism and long-life learning in pharmaceutical area of interest.

8. Program Standards & Benchmarks [Annex (2)]

Program Standards

- Rules and Regulations of the Ministry of Education and Scientific Research, Yemen.

Program Benchmarks

- 1- Master of Medicinal Chemistry Program - Faculty of Science, Medicine and Health- Wollongong University, Australia.
www.uow.edu.au/student/handbook/
- 2- The Master of Science in Medicinal Chemistry Program - Department of Medicinal Chemistry- Ernest Mario School of Pharmacy - Rutgers University- USA
www.pharmacy.rutgers.edu/programs/graduate-programs/medicinal-chemistry-ms-and-phd/
- 3- Master degree in Pharmaceutical Sciences (Pharmaceutical Chemistry)- Faculty of Pharmacy- Cairo University- Egypt.
www.pharma.cu.edu.eg/english/academicprograms/pgprograms/pgcourses.aspx?mdcode=10&mdpcode=2
- 4- The Master of Science in Medicinal Chemistry- Faculty of Health and Medical Sciences- University of Copenhagen (UCPH)- Denmark.
www.studies.ku.dk/masters/medicinal-chemistry/
- 5- Master degree In Pharmaceutical Sciences (Pharmaceutical Chemistry)- Faculty of Pharmacy- Beirut Arab University-Lebanese.
www.bau.edu.lb/program/pharmacy/master/pharmaceutical-chemistry/
- 6- The Master of Science in Medicinal Chemistry Program - St Louis College of Pharmacy- University of Health Sciences and Pharmacy- St Louis - USA.
www.uhsp.edu/programs/m-s-in-medicinal-chemistry/
- 7- Master in Medicinal Chemistry Program-Faculty of Graduate Studies- Health Sciences Department-Arab American University-Palestine.



www.aaup.edu/academics/Graduate-Studies/Faculty-Graduate-Studies/Health-Sciences-Department/Master-Medicinal-Chemistry/

9. Graduate attributes

Upon successful completion of the Master of Medicinal Chemistry Program, graduates should be able to:

1. Demonstrates core knowledge, basics principles, theories and skills about the rational basis for design, syntheses and development of pharmaceutical compounds.
2. Demonstrates capability and skills for reviewing the scientific literature, writing reports/thesis and publishing papers.
3. Identify the research problems and appropriate strategies for solution in legal and ethical manner.
4. Design suitable research methods and proposal to address hypothesis, anticipates problems and considers alternative approaches.
5. Provide an appropriate plan for analyzing and interpreting the data and results obtained from the research work.
6. Communicate research proposal clearly and professionally in oral and written form.
7. Develop life-long learning, independent research abilities and professionalism in field of medicinal chemistry.
8. Demonstrate creativity, problem solving and critical thinking abilities besides time management and organizational skills during the experimental research work.

10. Program Intended Learning Outcomes (PILOs)

A. Knowledge and Understanding

Upon successful completion of the Master of Medicinal Chemistry Program, graduates should be able to:

- | | |
|-----|---|
| A1. | Illustrate the advanced specialized knowledge in the field of Medicinal Chemistry including the rational drug design, syntheses and development. |
| A2. | Demonstrate the recent research methodologies, techniques and guidelines in practicing medicinal chemistry research taking into account the legal and ethical principles. |

B. Intellectual Skills

Upon successful completion of the Master of Medicinal Chemistry Program, graduates should be able to:

- | | |
|-----|--|
| B1. | Design scientific and systematic research proposals on the basis of a critical review of articles in international journals and patent literature to study a specified problem in Medicinal Chemistry field. |
| B2. | Select an appropriate potential strategy to solve the encountered problems in all stage of pharmaceutical research. |
| B3. | Analyze/interpret information and results obtained from the practical work and apply them in publishing papers in specialized journals. |

C. Practical and Professional Skills



Upon successful completion of the Master of Medicinal Chemistry Program, graduates should be able to:	
C1.	Use computational chemistry to design novel compounds of potential biological activities
C2.	Perform practical experiments of research in accordance with recent research methodologies, techniques, ethical aspects and GLP guidelines.
C3.	Utilize skills for writing professional reports and thesis and publishing research papers.
D. Key Transferrable Skills	
Upon successful completion of the Master of Medicinal Chemistry Program, graduates should be able to:	
D1.	Demonstrate communication, organization, time management skills as well as decision-making, problem-solving, critical thinking abilities during research work.
D2.	Develop professionalism and long life-learning.
D3.	Review/evaluate scientific literatures and new knowledge in the medicinal chemistry fields.

11. Teaching Strategy to Achieve Program Learning Outcomes		
PILOs	Teaching Strategy	Assessment Methods
Knowledge and Understanding A1, A2	Lectures. Independent study Self-Learning. Active learning Computer hands-on sessions. Presentations Seminar	Written Exam Oral Discussion Presentations Quizzes Survey Assignments Seminar
Intellectual Skills B1, B2, B3	Interactive Lectures Seminars Discussions & Small group discussions Presentation Problems solving Brain storming Self-learning	• Written Exam Oral Discussion Presentations Quizzes Assignments Seminar Written report
Professional & practical skills C1, C2, C3	Independent study Self-Learning. Analysis and Problem Solving. Laboratory works. Presentation Seminar Project supervision Brain storming Publish research Research activities	Oral Discussion Presentations Laboratory Reports Experimental and field work Survey Assignments Seminar Written report Written research proposal Thesis and publications
General & Transferable Skills	Self-Learning. Active learning	Oral Discussion Presentations



PILOs	Teaching Strategy	Assessment Methods
D1, D2, D3	Presentations Seminar	Assignments Seminar Written report

Teaching Strategy	Description of the Main Strategy Used
Self -study	Self-study is an individualized learning experience that allows students to select a topic focus, define problems or questions, gather and analyze information, apply skills, and create a product to show what has been learned. A variety of web-based searches students will be assigned to learn how they can search for solutions using the Web.
Computer hands-on sessions.	Practical applications using a variety of software before the real design and implementation.
Problem Solving.	It allows students to become more active in their learning as they work out what information, they need to find out how to solve a particular problem. They can work out a problem collaboratively, practice research as well as testing different components to come up with a valid solution.
Laboratory works.	During laboratory sessions, students will be given experiments to work in groups where they can apply the theories and principles gained. This gives them the opportunity to have hands-on experience to design and conduct experiments in addition to analyzing, interpreting data obtained from experiments, and maximize their learning through actual simulation
Presentations	students present their work to the whole group, for discussion, criticism, and suggestions for improvement. Presentation sessions provide an opportunity to address questions, queries, and problems.
Project supervision	The teacher needs to set advance work for students, and then have the students present their work to the whole group, for discussion, criticism, and suggestions for improvement. Project sessions provide an opportunity to address questions, and problems.
Brain storming	Brainstorming is an effective technique for generating lists of ideas and creating interest and enthusiasm for new concepts or topics. Brainstorming provides teachers and students with an overview of what students know and/or think about a specific topic. Students can use brainstorming to organize their knowledge and ideas.
Seminar	The teacher needs to set advance work for a selected number of students, and then have the selected students present their work to the whole group,



	for discussion, criticism, and suggestions for improvement. Seminar sessions provide an opportunity to address questions, queries, and problems.
Research activities	Research-led activities envisage activities in which students learn about current research in the discipline and are frequently an audience. The emphasis is put on the research content.

Assessment Strategy	Description of the main strategy used.
Oral Discussion	To know the knowledge of the students.
Presentations	For Final Results displaying, to enhance the level of students in different subjects.
Laboratory Reports	To demonstrate the personal skills, practical expertise, communication skills, report writing skills, and team work expertise they are expected to be learned and gained through their education.
Experimental and field work	For evaluation, to demonstrate the personal skills, practical expertise, communication skills, report writing skills, and team work expertise they are expected to be learned and gained through their education.
Seminar	As mentioned in the course specification and used to measure the higher thinking skills of students.
Assignments	The entire assignments including problem-solving exercises of coursework activities and homework during the teaching period of each course. (which includes group and individual work, tests and presentations, etc.)
Written research proposal	According to university guidelines
Thesis and publications	According to university and journal guidelines

12. Intended Learning Outcomes Mapping:

See Annex (10)

13. Program Structure:

No	Requirements	No. of Courses	Credit Hours	Rational Weight %
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1	University Requirements	Compulsory			
		Elective			
2	Basic Requirements	Compulsory			
		Elective			
3	Faculty Requirements	Compulsory	2	4	11.1
		Elective			
4	Department Requirements	Compulsory			
		Elective			
5	Program Requirements	Compulsory	9	26	72.2
		Elective			
6	Field Training	Compulsory			
		Elective			
7	Project Courses	Compulsory		6	16.7
		Elective			
	Total:			36	100%

Elective Courses: None									
1.1. Faculty Requirements									
Compulsory Courses (2 courses/ 4 Hrs)									
No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites
1	1/1	PHR1	Pharmaceutical Biostatistics		2				
2	1/1	PHR2	Research Methodology		2				
Total					4				

Elective Courses: None									
1.2. Program Major									
Compulsory Courses (9 courses/ 26 Hrs)									
No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites
1	1/1	MCh311	Advanced Pharmaceutical Instrumental Analysis I		3	3			



2	1/1	MCh312	Drug Design I		3	3			
3	1/1	MCh313	Medicinal Chemistry I		3	3			
4	1/1	MCh314	Modern Synthetic Strategy for Drugs		3	3			
5	1/2	MCh321	Advanced Pharmaceutical Instrumental Analysis II		3	3			
6	1/2	MCh322	Drug Design II		3	3			
7	1/2	MCh323	Heterocycles in Medicinal Chemistry		3	3			
8	1/2	MCh324	Medicinal Chemistry II		3	3			
9	1/2	MCh325	Seminar in Medicinal Chemistry		2	2			
Total					26	26			
Project Work Courses (courses/ 3 Hrs)									
No	Level-Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites
1									
Total									

Study Plan:									
Level 1									
Semester 1									
No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites
1	1/1	MCh311	Advanced Pharmaceutical Instrumental Analysis I		3	3			
2	1/1	MCh312	Drug Design I		3	3			
3	1/1	MCh313	Medicinal Chemistry I		3	3			
4	1/1	MCh314	Modern Synthetic Strategy for Drugs		3	3			
5	1/1	PHR11	Pharmaceutical Biostatistics		2	2			
6	1/1	PHR12	Research Methodology		2	2			
					16	16			
Semester2									
No.	Level-Sem.	Course Code	Course Name	اسم المقرر	Cr. Hrs.	L	T	P	Prerequisites, Co-requisites



1	1/2	MCh321	Advanced Pharmaceutical Instrumental Analysis II		3	3			
2	1/2	MCh322	Drug Design II		3	3			
3	1/2	MCh323	Heterocycles in Medicinal Chemistry		3	3			
4	1/2	MCh324	Medicinal Chemistry II		3	3			
5	1/2	MCh325	Seminar in Medicinal Chemistry		2	2			
Total					14	14			

Distribution of Total Credit Hours:														
Level	Term	University Requirements		Faculty Requirements		Program Requirements		Training		Project		Total Cr. Hrs.		Total Cr. Hrs./ Level
		No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	No. of Courses	Credit Hours	
First	First			2	4	4	12					6	16	
	Second					5	14					6	14	
											6		6	
Total:				2	4	9	26				6		36	
Percentage:														

14. Admission Requirements:

- Admissions to the program shall be made as per the admission rules set by the Ministry of Education and Scientific Research as well as University of admission guidelines.
- Bachelor in Pharmacy with at least performance of Good.

1. Attendance and Graduation Requirements:

- Passing all the courses exams.
- Student will graduate after successfully passing all program requirements.
- Publishing at least one research in one of the international journals.

2. Grading System:

From 90% to 100% of total marks	Excellent
From 80% to less than 90%	Very Good
From 75% to less than 80%	Good
From 65% to less than 75%	Pass
Less than 50%	Poor/Fail

Facilities Required for Running the Program:

- Sufficient hall furnished with all necessary pieces and equipment.



2. A Lab. as per the courses specifications.
3. Academic and administrative staff offices
4. Library.
5. Researching center.

Thesis

The student must prepare and discuss a Thesis.

Thesis and Its Requirements (if any)

1. Registration of the thesis:

(Requirements/conditions and procedures for registration of the thesis as well as controls, responsibilities and procedures of scientific guidance)

- Completion of all university requirements.
- Field of Research and precise research topic with short description and suggested time plan.
- First Department Seminar.
- Decision letter (Supervisors) of acceptance of the research topic.
- Any further requirements and controls based on post-graduate deanship regulations.

2. Scientific Supervision:

(The regulations of the selection of the scientific supervisor and his/her responsibilities, as well as the procedures/mechanisms of the scientific supervision and follow-up)

- At most 2-3 supervisors are selected for the supervision of a thesis.
- At least 1 -Associate (or Full) Professor is appointed as specialized supervisor in the department.
- Any Assistant professor appointed as supervisor should be from the department, should have at least 4-year experience in the field of research and published at least one paper. Candidates may apply for one-year extension (full-time) for completion of the thesis to the Postgraduate Program Administration at the Faculty of Pharmacy, which will be granted if the candidate provides a valid reason for extension.

The supervisor responsibilities are - :

- Help and assist the candidate/researcher in preparing the research plan.
- Guide the candidate to adhere to certain standards of academic integrity and research ethics, including combating plagiarism.
- Monthly, follow up and meeting with the researcher (at least one meeting per month) ,
- Guide the researcher at every step to be done during thesis work,
- Write follow-up (progress report) after each meeting
- Write a follow-up (evaluation report) every semesters.
- The supervisor shall submit copies of these reports to the Postgraduate-Program coordinator, the Head of the Department and the Head of the Faculty Post-graduate.



- Write the final thesis acceptance report in order to prepare the final department seminar and then initiating the preparation for thesis presentation, defense and approve.

The candidate/student responsibilities are - :

- Student present his/her accomplishment at the end of every semesters
- plan and actively pursue the research;
- identify and deal with any research-related problems;
- comply with administrative requirement;
- meet ethical guidelines;
- take responsibility for the final form of the thesis
- A thesis or research portfolio is the outcome of independent research, or creative activity conducted under supervision.
- The length of a (6) credit hours thesis or research portfolio will be appropriate to the discipline and must not exceed ... words, including bibliography, footnotes or endnotes and essential appendices, unless specific permission has been granted by the Department.

3.Thesis Defense/Examination:

(The regulations for selection of the defense/examination committee and the requirements to proceed for thesis defense, the procedures for defense and approval of the thesis, and criteria for evaluation of the thesis)

- A thesis proceeds for defense following completion of:
- At least two research paper is accepted in a journal in the field of research.
- Final acceptance letters provided by the supervisor(s) and the department final seminar committee (at least 3-department members),
- The examination committee should consist of - :
- One -Associate (or Full) Professor specialized in the field of research from an external university ,
- One -Associate (or Full) Professor from the department of Medicinal chemistry, Pharmacy in addition to the supervisor of the thesis.
- A session for presentation, defense and approval of the thesis should be done based on the following- :
- At least two members of the examination committee accept their assignment and reply by acceptance letter and approve the thesis for defense within one month.
- The session of defense should be declared within two weeks after receiving of examination committee members' approval letters.

15. Teaching staff:

	Professor	Associate Professor	Assistant Professor	Technicians Assistants
Required Number	4	2	7	2
Available Number	4	2	7	2
Note:				



16. Program Management and Regulations

1. Program Management

1.1 Program Structure

(including boards, councils, units, committees, etc.)

1.2 Stakeholders' Involvement

Describe the representation and involvement of stakeholders in the program planning and development. (students, professional bodies, scientific societies, alumni, employers, etc.)

2. Program Regulations

Provide a list of related program regulations, including their link to online version: admission, study and exams, recruitment, appeals and complaint regulations, etc.)

Decision of the Presidency of the Council of Ministers No. 40 of 2008

Decision of the Presidency of the Council of Ministers No. 141 of 2008

Graduate Studies Guide to Sana'a University

17. Evaluation of Program Quality Matrix:

Evaluation Areas/Aspects	Evaluation Sources/References	Evaluation Methods	Evaluation Time
Partnerships	External Experts and Specialist	Interviews	beginning of semesters
Learning Resources	Students	Course reports	During study
Effectiveness of Teaching & Assessment	Graduates	Questionnaires	End of academic year
Program Leadership	Program Leaders	Reports	Any time
Note: Evaluation Areas/Aspects (e.g., leadership, effectiveness of teaching & assessment, learning resources, partnerships, etc.) Evaluation Sources (students, graduates, alumni, faculty, program leaders, administrative staff, employers, independent reviewers, and others (specify) Evaluation Methods (e.g., Surveys, interviews, visits, etc.) Evaluation Time (e.g., beginning of semesters, end of academic year, etc.)			

18. List of Annexes

Annex (1)	Academic Standards Curriculum Criteria of Accreditation Board for program.
Annex (2)	Survey of names of Similar Accredited Programs at International Universities (Benchmarks) for master of Medicinal Chemistry Program.
Annex (3)	Survey of Intended Learning Outcomes for similar Accredited electrical Programs at International Universities.
Annex (4)	Summary of similar Programs (Benchmarks) for master of Medicinal Chemistry Program.
Annex (5)	Survey of course names of Similar Programs.



Annex (6)	Survey/Mapping of Vision, Mission and Objectives of similar Accredited Programs at International Universities (Benchmarks) for master programs.
Annex (7)	Mapping of the mission and objectives of the program with the vision, mission and objectives of faculty, and the university.
Annex (8)	Main Themes/Sub-Themes with Relative weight for Program (if need)
Annex (9)	PILOs Distribution to General Themes for Program (if need)
Annex (10)	Matrix of mapping program P- ILO's with courses
Annex (11)	Mapping the benchmarks with PILO's (if need)
Annex (12)	Mapping Program's Goals with Intended Learning Outcomes
Annex -13	The Admission Requirements for the Program.



Appendix



Annex (2); Survey of names of Similar Accredited Programs at International Universities (Benchmarks) for Master of Medicinal Chemistry Program.

	The Similar Programs (Benchmarks)							Current Program
	1 st Program	2 nd Program	3 rd Program	4 th Program	5 th Program	6 th Program	7 th Program	
Program Title	Master of Medicinal Chemistry	M.S in Medicinal Chemistry	Master Degree in Pharmaceutical Sciences [Pharmaceutical Chemistry]	The Master of Science in Medicinal Chemistry (MSc in Medicinal Chemistry)	Master of Pharmaceutical Chemistry	The Master of Science in Medicinal Chemistry	Master in Medicinal Chemistry	Master of Medicinal Chemistry
Faculty	Faculty of Science, Medicine and health	Ernest Mario School of Pharmacy	Faculty of Pharmacy	Faculty of Health and Medical Sciences	Faculty of Pharmacy	St Louis College of Pharmacy	Faculty of Graduate Studies	Faculty of Pharmacy
University	Wollongong	Rutgers University	Cairo	University of Copenhagen	Beirut Arab University	University of Health Sciences and Pharmacy- St Louis	Arab American university	Sana'a
Country	Australia	USA	Egypt	Denmark	Lebanese	USA	Palestine	Yemen

Annex (4); Summary of similar Programs (Benchmarks) for Master of Medicinal Chemistry Program.

	The Similar Programs (Benchmarks)							Current Program
	1 st Program	2 nd Program	3 rd Program	4 th Program	5 th Program	6 th Program	7 th Program	
Program Title	Master of Medicinal Chemistry	M.S in Medicinal Chemistry	Master Degree in Pharmaceutical Sciences [Pharmaceutical Chemistry]	The Master of Science in Medicinal Chemistry (MSc in Medicinal Chemistry)	Master of Pharmaceutical Chemistry	The Master of Science in Medicinal Chemistry	Master in Medicinal Chemistry	Master of Medicinal Chemistry
Faculty	Faculty of Science, Medicine and health	Ernest Mario School of Pharmacy	Faculty of Pharmacy	Faculty of Health and Medical Sciences	Faculty of Pharmacy	St Louis College of Pharmacy	Faculty of Graduate Studies	Faculty of Pharmacy



University	Wollongong	Rutgers University	Cairo	University of Copenhagen	Beirut Arab University	University of Health Sciences and Pharmacy- St Louis	Arab American university	Sana'a
Country	Australia	USA	Egypt	Denmark	Lebanese	USA	Palestine	Yemen
Type of Program	Master	Master	Master	Master	Master	Master	Master	Master
Study methods in the program:	Courses + research project	25 credit hours (16+9 elective) + Thesis	Courses + thesis	Courses + Thesis	Courses + Thesis	8 Courses (21 credit hours) + thesis (11 credit hours)	25 credit hours (16+9 elective) + Thesis	Courses + Thesis
Number of semesters	4-8 Semesters	2 Semesters + thesis	4-8 Semesters	8 Semesters	3 Semesters	4 Semesters	4 Semesters	4-8 Semesters
Total Credit Hours	96 credit points	25 credit hours + Thesis	18 credit hours + Thesis	105 ECTS credit (52.5 credit hours)	36 credits hours	32 credit hours	39 credit hours	36 credit hours
No. of Courses	13	9	11	7 modules	13	8	13	11

Annex- 5: Survey of course names of Similar Programs.

	Current Program	1 st Program	2 nd Program	3 rd Program	4 th Program	5 th Program	6 th Program	7 th Program
University	Sana'a University	Wollongong University	Rutgers University	Cairo University	University of Copenhagen	Beirut Arab University	University of Health Sciences and Pharmacy- St Louis	Arab American University
Faculty	Faculty of Pharmacy	Faculty of Science, Medicine and health	Ernest Mario School of Pharmacy	Faculty of Pharmacy	Faculty of Health and Medical Sciences	Faculty of Pharmacy	St Louis College of Pharmacy	Faculty of Graduate Studies
Program	Master of Medicinal Chemistry	Master of Medicinal Chemistry	M.S in Medicinal Chemistry	Master Degree in Pharmaceutical Sciences [Pharmaceutical Chemistry]	The Master of Science in Medicinal Chemistry (MSc in Medicinal Chemistry)	Master of Pharmaceutical Chemistry	The Master of Science in Medicinal Chemistry	Master in Medicinal Chemistry
Country	Yemen	Australia	USA	Egypt	Denmark	Lebanese	USA	Palestine
No. of Courses	11	13	9	11	7 modules	13	8	13
Total Cr. Hrs.	36 credits hours	96 credit points	25 credit hours + Thesis	18+ Thesis	105 ECTS credit (52.5 credit hours)	36 credits hours	36 credits hours	36 credits hours



Total Years	2-4 years	2-4 years	2year + Thesis	2-4 year	4-years	3 Semesters	2 years	2 years
Term No								
	Advanced Pharmaceutical Instrumental Analysis I	Contemporary Analytical Chemistry	Interpretation of Organic Spectra	Spectroscopic and chromatographic studies in pharmaceutical Chemistry I	Pharmaceutical Analytical Chemistry	Pharmaceutical Analysis	Spectroscopic Identification of Organic Compounds	Instrumental Analysis Or Spectroscopy of Organic compounds
	Drug Design I	Concepts in Medicinal Chemistry	Principles of Drug Design	Drug Design I	Biopharmaceuticals: Design and Modification of Biomacromolecules	Drug Design		Drug Design and development
	Medicinal Chemistry I	Advanced Topics in Medicinal Chemistry		Advanced topics in pharmaceutical Medicinal Chemistry I	Medicinal and Biostructural Chemistry	Medicinal Chemistry I	Medicinal Chemistry I	Medicinal Chemistry I
	Modern Synthetic Strategy for Drugs	Advanced Organic Synthesis and Reactivity	Modern Synthetic Organic Chemistry	Advances synthesis of drugs	Reactions and Synthesis in Medicinal Chemistry	Drugs synthesis	Organic Synthesis	bioorganic Chemistry
	Pharmaceutical Biostatistics			Pharmaceutical statistics		Biostatistics		Biostatistics
	Research Methodology	Responsible Research	Medicinal Chemistry: Research Techniques and Principles + Research	Scientific Writing	Structure-based Drug Research	Research Methods	Scientific Integrity	Research skills and ethics
	Advanced Pharmaceutical Instrumental Analysis II	Contemporary Analytical Chemistry	Advances in Organic Chemistry - Interactive 2D NMR Spectroscopy	Spectroscopic and chromatographic studies in pharmaceutical Chemistry II	Principles and Practice of Bioanalysis			Advanced Pharmaceutical Analysis
	Drug Design II	Concepts in Medicinal Chemistry	Introduction to Molecular Modeling	Drug Design II	Biopharmaceuticals: Design and Modification of Biomacromolecules	Drug Discovery and molecular Modification		techniques in Drug Discovery
	Heterocycles in Medicinal Chemistry	Contemporary Organic Chemistry	Heterocycles in Medicinal Chemistry	Toxicological Chemistry.	Heterocyclic Chemistry		Organic Reaction Mechanisms	Heterocyclic Chemistry
	Medicinal Chemistry II	Advanced Topics in Medicinal Chemistry	Current Topics in Medicinal Chemistry	Biopharmaceutical Reaction Mechanisms.	Medicinal and Biostructural Chemistry	Advanced Medicinal Chemistry	Medicinal Chemistry II	Medicinal Chemistry II Or Special Topics in Medicinal Chemistry
	Seminar in Medicinal Chemistry		Seminar in Medicinal Chemistry				Medicinal Chemistry Seminar	Seminar in Medicinal Chemistry



Annex (7) Mapping of the mission and objectives of the master medicinal chemistry program with the vision, mission and objectives of faculty, and the university.

Relationship between Program Mission and the Mission of the Faculty.

There is a relationship between Program Mission and the Mission of the Faculty as both of them encourage development in discovery of potential drug by research

Mission of the Faculty	Program Mission
Excellence and leadership locally, regionally and globally, in providing knowledge and continuous education in the academic and research field in pharmaceutical sciences according to the markets needs and community services	Preparing qualified students with high professional ethics through innovative education and research study in the field of medicinal chemistry to meet the needs of the community healthcare locally and regionally .

Relationship between Program Goals and the Goals of the Faculty.

no	Goals of the Faculty	no.	Program Goals
1	Providing students with comprehensive knowledge about physiochemical properties and biological activities of medicinal substances required for formulating and preparing pharmaceutical products from their different sources, natural or synthetic.	1	1.Providing students with advanced knowledge regarding basics principles, theories, methods and skills of the scientific research in the field of medicinal chemistry to meet the needs of community health.
2	Providing students with opportunities, practical skills, and training in different pharmaceutical sciences to ensure effective contribution in enhancing the requirements of pharmaceutical industries and labor market needs to serve the community.		
5	Planning, designing and conducting undergraduate and postgraduate research using appropriate methodologies.	2,3	2.Suggesting possible plan for designing scientific and systematic research proposals to study a specified problem in the field of Medicinal Chemistry. 3.Applying appropriate scientific methodologies, ethical aspects and guidelines to carry out the experiments of the pharmaceutical research
6	Developing student's presentation, promotion, pharmaceutical marketing, administration, numeric and computation skills.	4	4.Developing skills for critically reviewing the scientific literature, writing reports/thesis and publishing papers.
7	Demonstrating student's capability of communication skills, time management, critical thinking, problem-solving, decision-making and team-working.	5,6	5.Demonstrating problem-solving, making decision, critical thinking abilities as well as organization, time management skills during the research work. 6.Communicating efficiently with colleagues and coworkers
9	Demonstrate a professional attitude through practicing in an ethical, legal manner and according to the GMP and GPP guidelines	7	7.Developing professionalism and long-life learning in pharmaceutical area of interest.



	and continuously maintaining his/her competence through lifelong learning.		
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The mission of master of medicinal chemistry program with mission of the university.

Mission of the University	Mission of the Program
Sana'a University aspires to achieve a national leading role in teaching, learning, scientific research and community service; and to be among the best regional universities and the foremost house of expertise and think tank in Yemen.	Preparing qualified students with high professional ethics through innovative education and research study in the field of medicinal chemistry to meet the needs of the community healthcare locally and regionally.

Relationship between Program Goals and the Goals of the University

Aims of the University	Aims of the Program
1	1. Providing students with advanced knowledge regarding basics principles, theories, methods and skills of the scientific research in the field of Medicinal Chemistry.
1h, 3, 11	2. Suggesting possible plan for designing scientific and systematic research proposals to study a specified problem in the field of Medicinal Chemistry
1f, 1g, 2, 3.	3. Applying appropriate scientific methodologies, ethical aspects and guidelines to carry out the experiments of the pharmaceutical research.
5, 6	4. Developing skills for critically reviewing the scientific literature, writing reports/thesis and publishing papers.
1d, 1e	5. Demonstrating problem-solving, making decision, critical thinking abilities as well as organization, time management skills during the research work.
10	6. Communicating efficiently with colleagues and coworkers.
1i	7. Developing professionalism and long-life learning in pharmaceutical area of interest.

Annex (10) Matrix of mapping program P- ILO's with courses

Courses	Program ILOs										
	A1	A2	B1	B2	B3	C1	C2	C3	D1	D2	D3
Advanced Pharmaceutical Instrumental Analysis I	*		*						*		*
Drug Design I	*	*	*	*	*	*	*	*		*	*
Medicinal Chemistry I	*		*	*		*	*		*	*	*
Modern Synthetic Strategy for Drugs	*		*		*	*	*	*	*	*	*
Pharmaceutical Biostatistics		*			*	*	*	*			
Research Methodology		*	*	*	*	*	*	*	*		
Advanced Pharmaceutical Instrumental Analysis II	*		*	*	*				*		*



Drug Design II	*	*	*	*	*	*	*	*	*	*	*
Heterocycles in Medicinal Chemistry	*		*	*		*	*	*	*	*	*
Medicinal Chemistry II	*		*	*	*	*	*	*	*	*	*
Seminar in Medicinal Chemistry		*			*		*	*	*	*	*

(Annex 12) Mapping Program's Goals with Intended Learning Outcomes

1. Providing students with advanced knowledge regarding basics principles, theories, methods and skills of the scientific research in the field of Medicinal Chemistry.	A1, A2
2. Suggesting possible plan for designing scientific and systematic research proposals to study a specified problem in the field of Medicinal Chemistry.	B1, B2, D2, D3
3. Applying appropriate scientific methodologies, ethical aspects and guidelines to carry out the experiments of the pharmaceutical research.	A2, C1, C2, C4
4. Developing skills for critically reviewing the scientific literature, writing reports/thesis and publishing papers.	A2, B1, C3, D3
5. Demonstrating problem-solving, making decision, critical thinking abilities as well as organization, time management skills during the research work.	B1, B2, C2, D1
6. Communicating efficiently with colleagues and coworkers.	C2, B2, D1
7. Developing professionalism and long-life learning in pharmaceutical area of interest.	A1, B2, C3, D2

(Annex -13) The Admission Requirements for the Program.

- a bachelor's degree in Pharmacy from the Faculty of Pharmacy, Sana'a University or from any of the faculties of Pharmacy – universities- recognized by Ministry of Education and Scientific Research.
Good in bachelor's degree
- The student must pass English as a Foreign Language (TOEFL) with a condition of no less than 450 or its equivalent as a requirement for admission to the program.