

## The Curriculum for the Master Degree in Biomedical Ethics

The Master Degree in **Biomedical Ethics** is awarded by the Faculty of Graduate studies by department of Clinical Pharmacy at Jordan University of Science and Technology (JUST) upon the fulfillment of the following requirements:

1. Compliance with the JUST master degree running regulations approved by the Dean Council.
2. Successful completion of **(34)** credit hours in one of the following tracks:

### **Firstly: The Comprehensive Exam Track**

#### **1. Compulsory requirements: 24 credit hours**

<b>Course Symbol and Number</b>	<b>Course Name</b>	<b>Credit Hours</b>
PHAR787	Research Ethics	3
PHAR788	Foundations of Bioethics	3
PHAR789	Empirical Research Methods	3
PHAR790	Clinical Trials and Ethics in Pharmacy	3
PHAR791	Biostatistics	3
PHAR792	Skills Development and Teaching Methods	3
PHAR793	Critical Thinking and Analysis	2
PHAR794	Practicum	3
PHAR795	Seminar	1

#### **2. Elective requirements: 10 credit hours**

<b>Course Symbol and Number</b>	<b>Course Name</b>	<b>Credit Hours</b>
PHAR796A	Ethics in Genomics Research and Clinical Practice	2
PHAR796B	Pediatric Bioethics	2
PHAR796C	Islamic Theological and Religious Aspects of Bioethics	2
PHAR796D	Ethics of Biomedical Technologies	2
PHAR797A	Neuroethics and Mental Health	2
PHAR797B	Law and Bioethics	2
PHAR797C	Public Health Ethics	2
PHAR797D	Reproductive Ethics	2
PHAR797E	Bioinformatics and e-health Ethics	2

- 3. Passing the Comprehensive Exam (PHAR798): zero credit hour after successfully passing 34 credit hours.**

## The Study Plan

### First Year:

#### First Semester:

Course Symbol and Number	Course Name	Credit Hours
PHAR787	Research Ethics	3
PHAR788	Foundations of Bioethics	3
PHAR789	Empirical Research Methods	3
PHAR 793	Critical Thinking and Analysis	2
	Total	11

#### Second Semester:

Course Symbol and Number	Course Name	Credit Hours
PHAR790	Clinical Trials and Ethics in Pharmacy	3
PHAR792	Biostatistics	3
	Specialty Elective	2
	Specialty Elective	2
	Total	10

#### Summer Semester:

Course Symbol and Number	Course Name	Credit Hours
PHAR794	Practicum	3

### Second Year:

#### First Semester:

Course Symbol and Number	Course Name	Credit Hours
PHAR792	Skills Development and Teaching Methods	3
	Specialty Elective	2
	Specialty Elective	2
	Specialty Elective	2
PHAR795	Seminar	1
	Total	10

#### Second Semester:

Course Symbol and Number	Course Name	Credit Hours
PHAR 798	Comprehensive Exam	0

## **Secondly: The Thesis Track**

### **1. Compulsory requirements: 19 credit hours**

<b>Course Symbol and Number</b>	<b>Course Name</b>	<b>Credit Hours</b>
PHAR787	Research Ethics	3
PHAR788	Foundations of Bioethics	3
PHAR789	Empirical Research Methods	3
PHAR790	Clinical Trials and Ethics in Pharmacy	3
PHAR791	Biostatistics	3
PHAR792	Skills Development and Teaching Methods	3
PHAR795	Seminar	1

### **2. Elective requirements: 6 credit hours**

<b>Course Symbol and Number</b>	<b>Course Name</b>	<b>Credit Hours</b>
PHAR796A	Ethics in Genomics Research and Clinical Practice	2
PHAR796B	Pediatric Bioethics	2
PHAR796C	Islamic Theological and Religious Aspects of Bioethics	2
PHAR796D	Ethics of Biomedical Technologies	2
PHAR797A	Neuroethics and Mental Health	2
PHAR797B	Law and Bioethics	2
PHAR797C	Public Health Ethics	2
PHAR797D	Reproductive Ethics	2
PHAR797E	Bioinformatics and e-health Ethics	2

### **3. Thesis**

<b>Course Symbol and Number</b>	<b>Course Name</b>	<b>Credit Hours</b>
PHAR 799A	Master Thesis	9
PHAR 799B	Master Thesis	6
PHAR 799C	Master Thesis	3
PHAR 799D	Master Thesis	0

## The Study Plan

### First Year:

#### First Semester:

Course Symbol and Number	Course Name	Credit Hours
PHAR787	Research Ethics	3
PHAR788	Foundations of Bioethics	3
PHAR789	Empirical Research Methods	3
	Total	9

#### Second Semester:

Course Symbol and Number	Course Name	Credit Hours
PHAR790	Clinical Trials and Ethics in Pharmacy	3
PHAR792	Biostatistics	3
	Specialty Elective	2
	Specialty Elective	2
	Total	10

### Second Year:

#### First Semester:

Course Symbol and Number	Course Name	Credit Hours
PHAR792	Skills Development and Teaching Methods	3
	Specialty Elective	2
PHAR795	Seminar	1
	Total	6

#### Second Semester:

Course Symbol and Number	Course Name	Credit Hours
	Master Thesis	9

## Course Description

### Compulsory Courses

**PHAR787. Research Ethics (3 credit hours):** This course will cover important aspects of responsible conduct of research (RCR). Topics include collaboration, mentoring, authorship, publication, peer review, plagiarism, whistleblowing, fabrication of data, conflict of interest, human subjects' protections, data ownership and sharing, secondary uses of data.

**PHAR788. Foundations of Bioethics (3 credit hours):** This course will include the moral theories and the philosophy of ethics in relation to health research and biomedical situations. This will be inclusive of history of bioethics and theoretical framework underpinning RCR and bioethics. Topics include clinical ethics, human experimentation, ethical theory, patient's right, end-of-life decisions, and other relevant topics. The main aim of the course is to prepare students to deal with clinically relevant ethical decisions based on established and sound theoretical foundations.

**PHAR789. Empirical Research Methods (3 credit hours):** This course will cover the research design and methods in relation to human subjects' research with the ethical aspects of such methods and its implication to public health. The main aim of this course will be to develop the research design capabilities of the students to be independent researchers. Topics will include study design, bias and confounding, risk assessment, interpreting and disseminating public health data, and case studies of ethical challenges in epidemiology

**PHAR790. Clinical Trials and Ethics in Pharmacy (3 credit hours):** This course will cater for the industry research in the large pharmaceutical industry in Jordan and the region as well as academics interested in this area of research. This will detail the aspects of clinical trials and the complex ethical challenges with specific attention to RCR ethical issues in the industry. These include Clinical Trials Methodology, Ethics of Clinical Trials design, Ethics of Research Participants Recruitments, Risk-benefit Assessment, Informed Consent in Research, Data Safety Monitoring Boards, Multi-national Research, Clinical Investigator Behavior, Independent Review and Oversight, and Research on Special Populations. The main aim of the course is to allow students to have expertise in clinical trials ethics, especially in relation to drug development for prevention and treatment.

**PHAR791. Biostatistics (3 credit hours):** As part of the training and preparation of the students, they will be prepared to carry out statistical analyses as researchers as well as understand and interpret data appropriately. The course will include probability, making inference from data, comparing means and proportions, association and prediction, multiple regression analyses, data management and presentation and power and sample size calculation.

**PHAR792. Skills Development and Teaching Methods (3 credit hours).** This course will cover, bioethics teaching pedagogy and English writing for non-native speakers, research ethics consultation and critical thinking in ethics, leadership and decision making, mediation and conflict resolution, communication, academic administration and management, and grant and manuscript

writing. The aim of this course is to develop high quality leaders from the master's graduates who are prepared to excel in the field of research ethics and bioethics in their institutions and countries.

**PHAR793. Critical Thinking and Analysis (2 credit hours).** The course includes fundamentals of critical thinking and analysis in sciences. The main aim of this course is to develop skills such as applying reason, open mindedness, active learning, higher-order thinking, non-linear thinking, logical thinking, information evaluation, problem solving, reflection and interpersonal communication which are essential to build an independent, self-directed thinkers and learners.

**PHAR794. Practicum (3 credit hours):** The practicum will involve a research paper and project for graduation by the student. The research will include one of the topic areas taught in the master's in relation to ethics and with the expectation of a manuscript ready for publication or implementation of new guidelines and policies as the product. The planning for the practicum will be early at the start of the year and according to the Individual Development Plan for each student. The practicum can involve analyses of existing policy or development of a new policy relevant to research or bioethics at an institution or government that would have an impact on society and research. In addition, students will be expected to either organize workshops on research ethics and bioethics or participate as members of a local ethics committee for at least 3 months. The students will be matched with two mentors to work with them to complete the practicum in coordination with the program instructors. The main objective of the course is to develop the skills of the students to apply the theory and course work they learned to practical and real-life challenges in bioethics and research ethics.

**PHAR795. Seminar (1 credit hour):** This is a course that involves the students presenting a case study for discussion in relation to RCR or clinical medical ethics and other areas of bioethics under supervision of the instructor. The students will each take turns in recording the lecture and posting it online and the rest of the students having an online discussion about it and then the presenter has a specific time by which to respond to the comments. The main aim of the course is to develop the independence and leadership of students in teaching in the area of research ethics and bioethics. The evaluations will depend on presentation of their topics and engagement in discussion with presentations of the other students.

### **Elective Courses**

**PHAR796A. Ethics in Genomics Research and Clinical Practice (2 credit hours):** This course covers biotechnology and modern scientific advances such as gene editing and genome wide research and other topics. Ethical/legal Issues Related to the Collection, Storage, Transfer, and Use of Human Tissue Specimens, Genetic Research Ethics, and Biosafety Procedures. The course also covers ethical issues associated with medical genetic testing and genetic counseling.

**PHAR796B. Pediatric Bioethics (2 credit hours):** Topics to be covered in this course include concepts of autonomy, beneficence, and the rights of parents and children, the complexities of a developing child and their decisions in relation to age of assent, treatment in clinical trials, newborn screening, stem cell research in children, and the role of culture and religion in involving parents and their children in research.

**PHAR796C. Islamic Theological and Religious Aspects of Bioethics (2 credit hours):** This course analyzes various moral problems in bioethics from theological perspectives with a focus on Islamic jurisprudence. Topics that will be covered include foundation of moral theories in Islamic tradition, concepts of decisions making for new innovations in Islamic law, as well as Islamic perspective on end-of-life care and euthanasia, organ donations, abortion, assisted reproduction technology, maternal-fetal relations, and social justice issues.

**PHAR796D. Ethics of Biomedical Technologies (2 credit hours):** The course covers current ethical issues in Biotechnology, including topics in medical biotechnologies (stem cell, gene editing, precision medicine, synthetic biology, enhancement, and vaccines), agricultural biotechnology (genetically modified plants, animals, and food), microbial biotechnology, forensic analysis, aquatic technology, and recombinant DNA technology. The course also covers Biotechnology regulations, safety, and biosecurity.

**PHAR797A. Neuroethics and Mental Health (2 credit hours):** This course covers ethics of neuroscience research ethics of medical care for patients with neurological disorders. The course includes research related to brain enhancement, neurotechnology and human behavior, free will and consent of mentally disabled individuals, and personal identity. Clinical and research decisions relevant to brain interventions, brain imaging, stem cell therapy, and disorders of consciousness will also be covered in relation to ethics.

**PHAR797B. Law and Bioethics (2 credit hours):** The focus of this course will be on law and regulations within the context of local and global aspects of research and clinical practice as they pertain to ethical practice. Topics to be covered are the right to privacy, the right to abortion, the interest of women and fetuses, doctor-patient relationships, informed consent, the right to refuse care, the ownership of life, organ transplantation, definition of death, sterilization, stem cell research, cloning.

**PHAR797C. Public Health Ethics (2 credit hours):** The course will focus on public health and ethics, including surveillance and public health practice. Public health case studies will be covered in relation to public health topics such as environmental health, nutritional epidemiology, infectious diseases outbreak and emergency preparedness in public health at the global and local levels. The main aim of the course is to prepare students to deal with public health practice and research ethical challenges. Each lecture will be a case study on a public health or epidemiology misconduct and discussion about the case and possible ethical solutions.

**PHAR797D. Reproductive Ethics (2 credit hours):** The course covers ethical challenges related to human reproduction and beginning-of-life. This includes identifying terms and procedures of assisted reproductive technologies and their clinical significance and ethical issues about their use, bioethical challenges of surrogacy, sex selection of embryos or fetuses and preimplantation genetic diagnosis and adoption. The risks of the procedures and the birth defects will be a focus of clinical and research ethical decision-making using case studies and local culturally relevant examples.

**PHAR797E. Bioinformatics and e-health Ethics (2 credit hours):** This course introduces the ethical, legal, and regulatory context of bioinformatics and e-health. It considers key ethical principles in healthcare research and how ethical principles have been adopted in the field of information and communication technologies. Ethical dilemmas in bioinformatics and e-health research and practice will be identified throughout the course, to be able to suggest reasonable bioinformatics and e-health interventions as well as discussing projects in which the exchange, sharing and linkage of data from systems and devices may create risks for trust and compromise privacy and confidentiality. This course introduces students to the key principles of information governance and responsible innovation, with a particular emphasis on certain circumstances in which patient data are being re-used for medical research.

**PHAR 798: Comprehensive Exam (0 credit hours):** In this course the student will set for an exam that includes all topics addressed throughout his academic program. Comprehensive exam will be held inside school of pharmacy under the supervision of specialized faculty members.

**PHAR 799 (A, B, C, D): Master Thesis (9, 6, 3, 0 credit hours)**

Individual research under the direction of a faculty member (s) and committee leading to preparation, completion, and oral defense of a thesis.