

King Khalid University



College of Science
Department of Biology



جامعة الملك خالد



كلية العلوم
قسم الاحياء



Master of Science in Toxicology and Forensic Evidences

Program Handbook

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Biology Department
College of Science
King Khalid University

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Introduction

•The Master of Science in Toxicology and Forensic Evidences is an academic and specialized program offered by College of Science, King Khalid University in Abha, Kingdom of Saudi Arabia, that combines the fields of toxicology and forensic science. This program is designed to provide students with a comprehensive understanding of the principles, techniques, and applications of toxicology and forensic analysis.

•Throughout the program, students will study the nature of toxic substances, their effects on the human and animal body, and the methods used to detect and analyze them. They gain a solid foundation in the scientific principles underlying toxicology, including biochemistry, physiology, and molecular toxicology. Additionally, they learn about the various types of toxins, their sources, and their impact on animals and human health.

•The forensic science component of the program focuses on the application of scientific techniques to investigate crimes and analyze evidence in relation to the field of toxicology. Students learn about crime scene investigation, evidence collection and preservation, and the analysis of forensic samples such as blood, DNA, and other body fluids. They also study the interpretation of forensic evidence and its presentation in legal proceedings.

- Practical training is a crucial aspect of this program. Students have the opportunity to gain hands-on experience in state-of-the-art laboratories, using advanced analytical instruments and techniques. They learn how to conduct experiments, analyze data, and interpret results accurately.
- The program also emphasizes critical thinking, problem-solving, and effective communication skills. Students are encouraged to think critically about complex toxicological and forensic scenarios, evaluate evidence, and propose evidence-based solutions. They also develop the ability to communicate their findings clearly and concisely, both in written reports and oral presentations.
- Graduates of the Master of Science in toxicology and Forensic Evidences program are well-prepared for careers in various sectors, including forensic laboratories, law enforcement agencies, research institutions, pharmaceutical companies, and regulatory bodies. They can work as forensic toxicologists, forensic scientists, toxicology consultants, research scientists, or pursue further studies at the doctoral level.

King Khalid University Vision, Mission and goals

Vision

- A globally leading university committed to human empowerment, regional development, and economic enhancement.

Mission

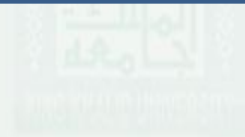
- An invigorating academic setting that fosters knowledge creation and application, champions research and innovation, emphasizes societal responsibility, and advances sustainable development by maximizing our potential and resources.

Strategic Goals

- Enhance educational outcomes to meet the needs of labor market requirements and sustainable development.
- Advance research and innovation in response to societal and economic imperatives.
- Foster a culture of social responsibility and encourage volunteerism.
- Enhance the overall quality of academic life.
- Realize and maintain institutional excellence for students and staff.
- Diversify and nurture sustainable revenue streams.

Program Mission

Providing basic and up-to-date knowledge and skills in toxicology, biological forensics and other related sciences.



King Khalid University

Program goals

- 1) Prepare students scientifically and support them with basic knowledge in biology and the science fields of toxicology, biochemistry, pathology, molecular biology and forensic science.**
- 2) Develop the theoretical and practical skills of students to be qualified for specific positions in the field of toxicology and criminal investigation.**
- 3) Training in information technology, effective communication, self-learning, and scientific thinking skills to serve the field of specialization.**
- 4) Enhancing the student's problem-solving skills using scientific methods, taking into account ethics and societal principles.**

Qualification Objectives

- **Comprehensive understanding:** Gain a deep understanding of toxicology principles, forensic science methodologies, and the relationship between toxic substances and their effects on the animal and human body.
- **Analytical skills:** Develop strong analytical and investigative skills to effectively analyze and interpret toxicological data and forensic evidence.
- **Laboratory techniques:** Acquire practical knowledge and proficiency in laboratory techniques, instrumentation, and procedures commonly used in toxicology and forensic analysis.
- **Research abilities:** Enhance research skills to conduct independent research projects, contribute to scientific literature, and stay updated with advancements in the field.

Qualification Objectives

- **Legal and ethical considerations:** Understand the legal and ethical aspects of toxicology and forensic science, including proper toxicology evidence handling, chain of custody, and the presentation of findings in legal proceedings.
 - **Collaboration and communication:** Develop effective communication and collaboration skills to work with multidisciplinary teams, present findings to stakeholders, and provide expert testimony when required.
 - **Critical thinking:** Cultivate critical thinking abilities to evaluate complex toxicological and forensic scenarios, identify potential challenges, and propose evidence-based solutions.
- By achieving these qualification objectives, graduates of the program are prepared to pursue careers in toxicology, forensic science, research, academia, or related fields.

Graduate attributes

The Graduate of the program will acquire the following attributes:

- Knowledge of consistent and structured biological sciences serving the effect of toxic materials on animal and human bodies, forensic evidences and that of the criminal scene, and are consistent with the principles of Islamic law,
- Knowledge of a comprehensive set of foundations, theories and principles relative to the toxicology and forensic sciences from the biological point of view,
- Familiarity with a broad and integrated range of skills required for effective practice in the field of identifying toxins of various kinds, cytotoxicity and molecular toxicity, and biological investigations in support of forensic evidence and crime scenes

Graduate attributes

- The ability to investigate complex scientific problems and find innovative solutions without guidance from others,
- The ability to identify and use appropriate statistical and mathematical methods in analyzing and finding solutions to complex issues,
- The ability to choose and use the most appropriate mechanisms for communicating scientific results to different recipients,
- Leadership ability and willingness to fully cooperate with others on scientific projects and joint initiatives.

Curriculum Structure

Program Structure	Required/ Elective	No. of courses	Credit Hours	Percentage
Course	Required	15	36	80%
	Elective	1	3	6.66%
Graduation Project (if any)	Required	1	6	13.33%
Field Experience(if any)	-	-	-	-
Residency year	-	-	-	-
Others	-	-	-	-
Total		17	45	100%

Program Courses

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
Level 1	LAW 6101	Forensic Law and Crime	Required	-	2T	Program
	TOX 6601	Vital Fundamentals of Forensic Sciences	Required	-	3T	Program
	TOX 6602	Fundamentals in General Toxicology	Required	-	3T	Program
	BIS 6107	Bioinformatics & Statistical analysis	Required	-	2T	Program
Level 2	TOX 6603	Environment Toxicosis	Required	-	3T	Program
	TOX 6605	Forensic Molecular Toxicology	Required	-	3T	Program
	TOX 6606	Metabolism & Toxicant Pathobiology	Required	-	3T	Program
	TOX 6604	Biosecurity and Safety	Required	-	3T	Program
Level 3	CHEM 6203	Drugs Identification & Classification	Required	-	2P	Program
	CHEM 6206	Analytical Toxicology	Required	-	3P	Program
	TOX 6612	Seminar	Required	-	2T	Program
	TOX 6614	Research Skills	Required	-	2T	Program
	TOX 6607	Cellular Immunity & Toxicology	Elective	-	3T	Program
	TOX 6608	Food Poisoning	Elective	-	3T	Program
Level 4	TOX 6609	Epigenetics and Fingerprints	Required	-	1T+1P	Program
	TOX 6610	Biodiagnosis and Forensic Tracing	Required	-	2P	Program
	TOX 6613	Forensic Microscopy	Required	-	2T	Program
	TOX 6611	Graduation Research Project	Required	-	6	Program

Student Admission Requirements

- The applicant must be a Saudi, or a non-Saudi.
- The applicant must have obtained a university degree from a Saudi university, or from another recognized university.
- He must be of good conduct, and medically fit.
- Should submit two scientific recommendations from professors who previously taught him.
- The council of KKU university may add to these general conditions what it deems necessary.
- A condition for admission to the (Master's) stage is that the student attains a grade of (Good) at least.
- Based on the recommendation of the department, and College council, the number of students who achieved the required conditions will be accepted according to the number approved.

Essential links

All of the required information is available at the following links:

<https://dps.kku.edu.sa/>

<https://dps.kku.edu.sa/ar/content/391>

<https://dps.kku.edu.sa/ar/content/434>

[https://dps.kku.edu.sa/sites/dps.kku.edu.sa/files/general_files/files/Guide to submission.pdf](https://dps.kku.edu.sa/sites/dps.kku.edu.sa/files/general_files/files/Guide_to_submission.pdf)

<https://dps.kku.edu.sa/ar/content/1002>

Services offered to students and staff

(i) Student Counseling Services

King Khalid University and by indeed the College of Science and Biology department provide counseling services that can be an integral part of the educational mission to:

1. Provide high-quality counseling services to students and staff and assist them to develop their skills either in learning or research, use and improve their abilities.
2. Take an advising role in helping students identify and learn new skills either in learning or research that will help them achieves and improve their academic and goals effectively.
3. Support and help students progress and development through counseling and outreach to the campus community.
4. To provide effective psychological and personal counseling follow-up services to ensure student care. Moreover, students are well encouraged to participate in different cultural and social activities that are compatible with their interests and needs. The aforementioned rules are honestly and transparently applied in both (Boys and Girls) sections.

Student Counseling Services

5. Clear mechanisms are applied to identify gifted, creative, talented, and underachieving students in the program, and appropriate programs are available to care for, motivate, and support each group of them.

- In the program, student should be appointed an academic advisor from the start of their program to guide them in their studies. All advisors need to fill in a report for each of their students to indicate their academic status and progress, and send the reports to the program coordinator, which in turn, takes the appropriate action when needed, such as issuing a warning or dismissal, based on the reports available in the electronic system and those received from the academic advisors.

- The mechanisms provided by the Faculty of Science that help in identification of underachieving students are _ (Counselling and Guidance Unit Guide):

- The course coordinators go over each module's assessment results and identify the underachievers and identifies the struggling students by reviewing their transcripts on a regular basis.

Student Counseling Services

5. Helping students with special needs, during their university life, to achieve the highest levels of psychological and social adjustment and academic achievement as permitted by their abilities, study their problems, and work to solve them.

6. Providing a safe environment for students to take a major role for contributing to campus safety.

Trusted staff members will be admitted providing individual counseling services to students, faculty, and staff regarding variety of issues.

In some instances, students may be referred or mandated to receive counseling services. These instances include but not limited to: low academic performance (as measured by GPA), smoking on campus (smoking on campus is prohibited in all open and closed areas), and behavioral conduct issues. Confidentiality for these students is limited as the counselors are responsible to communicate with referral source to provide the following information: student's attendance and participation, treatment plan, and progress reports. Students are informed regarding the limits of confidentiality in such cases.

(ii) Saudi Digital Library

- Online specialized electronic resources (books and journals) are available through the Saudi Digital Library websites. These resources can be accessed from within or outside the KKU university using user names and passwords by all teaching staff and enrolled student.
- Saudi Digital Library have a user-friendly digital search engines similar to international universities i.e., Clarivate, Science direct, Wiley, ProQuest, Google Scholar, Web of Science and Scopus that provide both full text articles and abstract

Rights and Duties

The program followed the KKU guideline of Rights and Duties which is an important guide including a detailed guidance regarding students' academic rights and non-academic rights. It aimed to ensure the quality of the educational process and the rights of both students and university employees. The book displayed the disciplinary regulations for violated students. The regulations aimed to control students' misbehavior inside the university and its facilities as well as prepare them to be a good individual in the community. The University confirmed that the students have the right to appeal against action taken if they believed they are guilty or the penalties had been taken against them is unfair. This book also showed that the university has considered a mechanism to review the regulations on rights and duties, the discipline regulations, and grievance controls based on the results of the actual implementation of those regulations.

The guidelines of Rights and Duties is available at the following link:

https://www.kku.edu.sa/sites/default/files/general_files/pdf/Administration/guide.pdf

Scientific Integrity Policies

The program management is committed to activating the values of the scientific integrity, rules of ethical practices, and proper conduct in all academic, research, administrative, and service fields and activities.

The program management implement these through the application of standards and professional research ethics that work to provide integrity and clarity in the program through general guidelines including:

- Scientific Integrity rules ([Link](#))
- Bioethics rules ([Link](#))
- Code of Conduct and Public Employment Ethics ([Link](#))
- The executive regulations for Scientific research on living organisms ([Link](#))
- Job Conduct Rules ([Link](#))

Essential links

- **Student Clubs Unit, KKU** (<https://clubs.kku.edu.sa/ar/clubsunit>)
- **College of Science Club** (<https://clubs.kku.edu.sa/ar/CScience>)
- **Housing Club** (<https://clubs.kku.edu.sa/ar/housing>)
- **Toastmasters Club** (<https://clubs.kku.edu.sa/ar/tostmastrs>)
- **Club of Arabic calligraphy and plastic art** (<https://clubs.kku.edu.sa/ar/ArCalligraphy>)
- **Diving club** (<https://clubs.kku.edu.sa/ar/diving>)
- **Equestrian Club** (https://clubs.kku.edu.sa/ar/equestrain_club)
- **Reading Club** (<https://clubs.kku.edu.sa/ar/reading>)
- **Manara Club** (<https://clubs.kku.edu.sa/ar/manarah>)
- **Entrepreneurship Club** (https://clubs.kku.edu.sa/ar/leading_businesses)
- **Nazaha Club** (<https://clubs.kku.edu.sa/ar/nazaha>)
- **Wesal Club** (<https://clubs.kku.edu.sa/ar/wesal>)
- **Scholarship students Club** (https://clubs.kku.edu.sa/ar/Scholarship_Students)

Curriculum Courses Description

Forensic Law and Crime

Course general Description

Brief description of the basic learning outcomes for students enrolled in the course, and reviews the following topics: What is crime - types of crime and its subdivisions, elements of the material pillar of the crime and the divisions based on it, criminal behavior, criminal consequence and causal relationship, material crimes and formal crimes, divisions of crimes according to its material pillar, temporary crime and persistent crime - multiple crimes - simple crime and common crime, criminal responsibility, the basis of criminal responsibility is the assignment, selection, and wrongful act of ransom and neglect, contraindications to criminal responsibility, which are the offense of the minor - and acts that are indiscriminate due to insanity and drunkenness - the state of compulsion - necessity - non-voluntary acts – wrongdoing, reasons for legalization, the right to legal defense, conditions for the emergence of legal defense, conditions for the use of the right to legal defense, restrictions on the right to legal defense, performing the duty and using the right, an accident is defined, the consent of the victim, his definition and conditions. Furthermore, the initiation - the pillars of the initiation - his punishment - Participation consists in participation in implementation of a criminal agreement, criminal participation without a criminal agreement, and the order to commit a crime, compel it, incitement, agreement, and assistance, that is, assistance. Sanctions: definition, their characteristics, purposes and types

Bioinformatics & Statistical analysis

Course general Description

Bioinformatics is interdisciplinary field within biology and biosciences for storing, retrieving, organizing and analyzing biological and genetic databases. The course aims to review and use the principles and applications of advanced techniques of DNA testing in body tissues or fluids residues and statistics for personal identification. It commonly depends on the phylogenetics and sequences of the DNA and protein structures from the background data.

Vital Fundamentals of Forensic Sciences

Course general Description

This course provides a study of the fundamentals of the forensic sciences from the perspective of biological sciences and experiences to enable the student and the specialist in that field to issue his technical judgment in a criminal report that does not accept any doubt, as the learner acquires for the course the skill of distinguishing between natural deaths and those resulting from criminal causes, and determining The identity of human or animal corpses and waste.

Fundamentals in General Toxicology

Course general Description

The course offers an academic general knowledge about the toxicants and poisons, their mode of action, signs, and diagnosis. The course will cover basics of toxicology, including; how the toxic substances are taken up in the organisms, distributed, biotransformed and excreted, how the toxic substances react with the biomolecules and downstream consequence for the organism, as well as short knowledge about the different toxic substances.

Environment Toxicosis

Course general Description

This is an advanced course offering an understanding of the ecological (natural) and environmental (synthetic) toxicology. It presents the basic concepts, characteristic features, origin, fate and approaches of the natural poisonous plants and those toxic metals or synthetic industrial polluting chemicals, like pesticides and industrial pollutants commonly encountered in soil, water and air. The course regards the toxicological effects of such toxicants on the living organisms; human, animal and living species, even the adjacent non-toxic/food plants. Also, it presents the accurate diagnosis in the toxicology/biological laboratory.

Biosecurity and Safety

Course general Description

The course is designed to provide the students with complete information regarding bio-safety and bio-security. Biosafety aims to protect the public health and environment from accidental exposure to biological agents. Preventive bio-security deals with prevention of misuse through loss, theft, diversion or intentional release of pathogens, toxins and any other biological materials. The prevention goals of bio-security are defined independently of the origin of the biological or non-biological material. It is considered that bio-safety and bio-security are complementary to address bio-risk issues. Bio-security and biosafety are complementary to each other forming what is called the “biorisk management”.

Forensic Molecular Toxicology

Course general Description

The course is concerned with the understanding of teratogenic, carcinogenic, radioactive, and toxic agents leading to molecular and biochemical changes in the different body tissues. Those effects: from the forensic point of view, should be clearly unveiled, recognized and differentiated among variant criminal agents. The course will qualify the student to work with international and local organizations as forensic investigator or expert in preparing the testimony reports relevant to a murder trial in depth.

Metabolism & Toxicant Pathobiology

Course general Description

The course is concerned with the comparative changes affecting the physiological pathways in the normal living tissues, and the associated cellular pathogenesis in response to forensic or criminal agents. According to the variety of those agents, the living body response will correspond in parallel and show specific printing evidence to the crime.

Cellular Immunity & Toxicology

Course general Description

The course could explain the importance of the cellular immunity against a wide variety of toxicants attacking the living body. It gives basic idea about the specific and non-specific immune mechanisms expressed by the living tissue cells to protect the human body from the fatal cellular changes induced by the poisoning or intoxication. Furthermore, it explains the immunosuppression induced by a wide variety of toxins, poisonous plants, pharmaceuticals and therapies, in addition to immunosensitivity and intervention in the immune system.

Food Poisoning

Course general Description

The purpose of this course is to develop an understanding of the nature and properties of toxic substances in foods, the nature, and the magnitude of hazards they represent. Food may be contaminated by bacteria, viruses, fungi, protozoa, environmental toxins, toxins present within the food itself in addition to toxins from different sources. This course will cover topics such as the formation, characteristics, and control of various toxins (natural and synthetic) that occur in the food. Fundamental concepts will be covered, including; principles of toxicology applicable to food toxicants, natural toxins from plants animals, and mushrooms, biotechnology-derived foods, dose-response relationships, elimination of toxicants, carcinogenesis, food allergy and sensitivity, risk assessment, laboratory diagnosis. An understanding of mathematical expressions commonly used to describe toxic effects. The impact of contaminants on nutrient utilization, adverse effects of nutrient excesses, pesticide residues, chemical toxins, food additives toxicity, and polycyclic aromatic hydrocarbons and other processing toxic products will be covered. The course will also focus on food safety and hazard analysis and critical control points in food industries

Epigenetics and Fingerprints

Course general Description

The course explains the definition of fingerprinting in addition to fundamentals in genetics/epigenetics, DNA damage, repair, recombination, and genotoxicity. Furthermore, it provides the student with the basic knowledge on the forensic importance of fingerprinting in solving the mysterious criminal scene.

Biodiagnosis and Forensic Tracing

Course general Description

The course could explain the importance of the biological forensic science as one of the important disciplines in the field of law and application of biology in criminal investigations and the achievement of justice. The course provides an overview on the biological materials that could be used for the biochemical and molecular testing of the forensic clues and thus considered reliable evidence in the criminal scenario. For example, it presents the basics of vaccinations and DNA analyses for identification of human remains, fingerprint and dose analysis, as well as criminal insects.

Forensic Microscopy

Course general Description

The course aims to explain the proper use of the different types of microscopes in the forensic use, to specialized courses focusing on a particular technique, material, or environmental field of application, like; foods, chemicals, soil, pollens, spores, glass, paint, fingerprints and the gunshot residues.

Drugs Identification & Classification

Course general Description

Forensic science uses scientific principles to support or deny theories surrounding the physical evidence found at crime scenes, and as such, the biologists and forensic scientists analyze evidence collected or received from crime scenes and present their findings based on the results of their analyzes. Forensic evidences depend on various scientific pillars in chemistry and biology; the most important of which is the study of narcotic drug substances, toxic chemicals and alcoholic substances that leave distinct imprints in living tissues, (such as blood, skin, bone, and body secretions). Such samples are used in the analysis of these materials in the laboratory To identify them and classify their risks and toxicities.

Analytical Toxicology

Course general Description

This course develops the skills in drug analysis and toxicants. The course will enhance their career prospects and give them the confidence and competence to make a difference in this fascinating field. Also, the course will qualify the students to professionally work in the field of drugs, vaccines and antidotes and be eligible to distinguish the types of toxicants; natural (mycotoxins/plant toxins), synthesized (pesticides), chemical toxins or insect/ reptile poisons.

Seminar

Course general Description

The seminar course is an interactive educational program designed to foster critical thinking and enhance knowledge in a specific subject area. Participants engage in discussions, presentations, and collaborative activities to explore various perspectives and deepen their understanding of the topic. Led by expert facilitators, the seminar course encourages active participation, encourages the exchange of ideas, and promotes intellectual growth. It provides a platform for individuals to expand their expertise, develop analytical skills, and engage in thought-provoking conversations with peers. The seminar course aims to create a stimulating learning environment that encourages lifelong learning and personal development.

Research Skills

Course general Description

The Research Skills course is a comprehensive program designed to equip participants with the necessary skills and techniques to conduct effective research. This course covers a wide range of topics, including research design, data collection methods, data analysis, and research ethics. Participants learn how to formulate research questions, develop research proposals, and navigate various research methodologies. The course emphasizes critical thinking, information literacy, and the ability to evaluate and synthesize research findings. Through practical exercises and hands-on projects, participants gain practical experience in conducting research and develop the skills needed to contribute to the advancement of knowledge in their respective fields.

Research Project

Course general Description

This course provides an advanced understanding of issues related to research methodologies that facilitate the development of students' ability to identify and utilize appropriate methodological and theoretical frameworks to support and manage their life projects. The course focuses on specific area of interest. The topics will be chosen based on the expertise of the professors, who will supervise the students' research projects, and this will vary from term to term based on the recent knowledge in the area of the interest. Students will enhance their skills to read and summarize the literatures related to their research topic. The course will encourage students to prepare themselves to write, discuss and interpret their own results in relation to the recent theories and knowledge that were approved and published in recent books and publications.

Contact information

For any inquiry regarding the program please contact:

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End of the program handbook