

**ESTABLISHMENT OF THE FIRST DOCTOR OF DENTAL SURGERY PROGRAM AT  
ZARQA UNIVERSITY, JORDAN**

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**Abstract**

*The cornerstone of the health of society is primary health care. Efficient dental health care at all levels is directly linked to effective primary health care. In the Hashemite Kingdom of Jordan, the Faculty of Dentistry at Zarqa University obtained approval from the Jordanian Accreditation and Quality Assurance Commission for Higher Education Institutions (AQACHEI) to start the program of Doctor of Dental Surgery (DDS), the first ever in a private university, beginning from the 2022/2023 academic year. A group of 130 local and 35 international students were accepted into the program. A novel and robust study plan, including a curriculum that focuses on clinical skills rather than basic medical sciences, was developed for this DDS program and was approved by the Faculty of Dentistry Council and the Deans Council of Zarqa University. The implementation of this study plan started with the first batch of selected students in October 2022 and the students are now in the summer semester of their first year of the program. Here, we describe the general outline and the study plan of this DDS program including its implementation instructions, and assessment methods as well as the challenges and implications for all stakeholders.*

**Keywords:** Curriculum, Doctor of Dental Surgery, Jordan, Study Plan, Zarqa University

## I. INTRODUCTION

The Faculty of Dentistry at the Zarqa University was established in 2022 as the first dental faculty in any Jordanian private university, in response to an urgent need for Jordanian society to fulfil the desire of thousands of Jordanian students who were going to study dentistry in foreign countries[1]. It consists of two buildings, the main faculty building and another building that is dedicated to clinical training, with an area of approximately 18,000 square meters. Both buildings contain halls, laboratories, and clinics that are furnished with the latest equipment and cutting-edge technologies[1]. The faculty will grant the Doctor in Dental Surgery (DDS) degree. To achieve a wide global reputation, faculty members were recruited from within and outside the country to teach and guide the students in their journey to becoming dentists. The faculty seeks to develop its competencies, attract new competencies, expand its capabilities, and diversify its educational resources. The process of developing a curriculum involves an organization or the instructor coming up with a plan for a course or program[2]. It also incorporates constant improvement, where the information is evaluated, altered, and updated by needs and requests, hence, it is not a stagnant approach[2].

Internationalization has fundamentally changed the outlook of education by emphasizing the acquisition of skills in addition to knowledge. Today's job markets are looking for graduates who can put their knowledge to use. Due to this demand, educational training programs have adopted curricula that align with the competence-based approach. This indicates that all training courses must be created so that, by the time the students graduate, they will have mastered a particular set of properly specified competencies to compete in both domestic and foreign job markets. The study plan and the DDS curriculum in our faculty integrates the professional competencies from the Australian [3], Canadian [4], and United Kingdom General Dental Councils [5] and Associations. This harmonization is key to providing our DDS graduates with a chance to favourably compete in terms of skills and industrial requirements at the global level. Thus far, it is not simple to create a unified DDS curriculum that describes generic graduate abilities while also allowing institutional freedom to tailor the training to local demands. From the start, we identified that key stakeholders needed to be involved in this process. We held a series of workshops for training on curriculum development with supervision from faculty experts and medical educationists from Queens and Aberdeen Universities of the United Kingdom.

The previously created competency-based undergraduate dentistry curricula from Australia and the United States were modified to create the required graduate competencies of our program, which were then used to create the DDS program's curriculum mapping without violating the Jordanian Accreditation and Quality Assurance Commission for Higher Education guidelines for creating a new dentistry faculty[6]. This paper presents a multi-professional and multi-institutional approach to developing a harmonized curriculum that will facilitate and identify the

fundamental competencies that were missing and make it easier for other institutions to accept the curriculum.

## II. OBJECTIVES OF THE DDS PROGRAM

The objectives of the DDS program at the Faculty of Dentistry, Zarqa University are to:

1. Provide an evidence-based dental education aligned with the framework for dental and health competencies of the Accreditation and Quality Assurance Commission for Higher Education Institutions of the Kingdom.
2. Adopt an interactive and healthy learning environment by implementing current trends in teaching, learning, and assessment in dental education.
3. Acquire in-depth dental knowledge, and develop analytical thinking, and problem-solving skills among graduates.
4. Graduate health professionals who serve their communities and provide humanistic patient care.
5. Promote scientific research and leadership readiness among graduates in line with Jordan's future vision.
6. Develop the communication, interpersonal, and information technology (IT) skills necessary to function as an effective and accountable member of a healthcare team.

## III. OVERVIEW OF THE STRUCTURE OF THE DDS PROGRAM

Here at Zarqa University, the DDS study plan is a semester-based program with annual promotion regulations. Subsequently, the promotion of students from year to year and from phase to phase will be based on cumulative grades (60% and above). Faculty requirements in pre-clinical Dental Sciences are 38 credit hours (Table 1). The compulsory courses studied by the students according to their sequence in the study plan, include the study of basic medical sciences during the first three years (49 credit hours), and the study of clinical medical sciences (4 credit hours) during the first and second semesters of the fourth year. Faculty requirements for dental sciences are 111 credit hours. The courses that will be taught according to their sequence in the study plan, including the study of faculty requirements in the pre-clinical stage (38 credit hours) and faculty requirements in the clinical stage (73 credit hours) are shown in Table 2.

**Table 1: Faculty Pre-Clinical Dental Sciences (38 Credit hours)**

<b>Course Title</b>	<b>Credit hours Total (Theory + practical)</b>
Dental Anatomy	2 (1+1)
Dental and Oral Histology	2 (1+1)
Oral Biology and Physiology	2 (2+0)
Dental Cariology	1 (1+0)
Dental Biomaterials 1	2 (1+1)
Dental Biomaterials 2	1 (1+0)
Oral Pathology 1	3 (2+1)

Dental Radiology and Oral Photography1	3 (2+1)
Dental Occlusion and Temporomandibular Joint disorders	2 (1+1)
Ethics & Jurisprudence	1 (1+0)
Operative Dentistry 1 / Preclinical	2 (1+1)
Endodontics 1 / Preclinical	2 (1+1)
Removable Prosthodontics 1 / Preclinical	3 (1+2)
Local anesthesia and pain control	2 (2+0)
Preventive Dentistry	1 (1+0)
Operative Dentistry 2/ Preclinical	2 (1+1)
Orthodontics 1/ Preclinical	2 (1+1)
Fixed Prosthodontics 1 / Preclinical	3 (1+2)
Introduction to Clinical Dentistry and Oral Diagnosis	2 (1+1)

**Table 2: Faculty Clinical Dental Sciences (73 Credit hours)**

<b>Course Title</b>	<b>Credit hours</b>
Oral Pathology 2	1 (1+0)
Operative Dentistry 3 / Clinical	2 (1+1)
Endodontics 2 / Clinical	2 (1+1)
Fixed Prosthodontics 2 / Clinical	2 (1+1)
Pediatric Dentistry 1 / Clinical	2 (1+1)
Removable Prosthodontics 2 / Clinical	2 (1+1)
Periodontics 1 / Clinical	2 (1+1)
Oral & Maxillofacial Surgery 1 / Clinical	2 (1+1)
Oral Medicine 1 /Clinical	1 (1+0)
Operative Dentistry 4/ Clinical	3 (1+2)
Endodontics 3 / Clinical	1 (0+1)
Fixed Prosthodontics 3 / Clinical	2 (1+1)
Removable Prosthodontics 3 / Clinical	2 (1+1)
Periodontics 2 / Clinical	2 (1+1)
Pediatric Dentistry 2 / Clinical	1 (1+0)
Oral & Maxillofacial Surgery 2/ Clinical	2 (1+1)
Dental Radiology and Oral Photography2	2 (1+1)
Oral Medicine 2 / Clinical	1 (1+0)
Orthodontics 2/ Clinical	2 (1+1)
Community Dental Health	2 (2+0)
Geriatric Dentistry and Special Needs	1 (1+0)
Research project	1 (1+0)
Operative Dentistry 5/ Clinical	2 (1+1)
Endodontics 4 / Clinical	2 (1+1)
Fixed Prosthodontics 4 / Clinical	1 (0+1)

Removable Prosthodontics 4 / Clinical	2 (1+1)
Periodontics 3 / Clinical	2 (1+1)
Oral & Maxillofacial Surgery 3 / Clinical	2 (1+1)
Orthodontics 3 / Clinical	2 (1+1)
Paediatric Dentistry 3 / Clinical	2 (1+1)
Comprehensive Clinical Dentistry 1	2 (0+2)
Oral Medicine 3 / Clinical	1 (0+1)
Operative Dentistry 6 / Clinical	1 (0+1)
Endodontics 5 / Clinical	1 (0+1)
Fixed Prosthodontics 5 / Clinical	1 (0+1)
Removable Prosthodontics 5 / Clinical	2 (1+1)
Periodontics 4 / Clinical	1 (0+1)
Oral & Maxillofacial Surgery 4 / Clinical	2 (1+1)
Orthodontics 4 / Clinical	1 (0+1)
Pediatric Dentistry 4 / Clinical	1 (0+1)
Comprehensive Clinical Dentistry 2	3 (0+3)
Oral Medicine 4 / Clinical	1 (0+1)
Emerging Trends in Dentistry and Clinical Management	1 (1+0)
Esthetic Dentistry	1 (1+0)
Implant Dentistry	1 (1+0)

#### IV. PROGRAM LEARNING OUTCOMES

On completing our DDS program, the graduate should be able to demonstrate the following Program Learning Outcomes (PLOs), which are in line with the Jordanian APACHEI and with at least 70% of them linked to the competencies of the Australian Dental Association. These PLOs were also approved by the Deans Council of Zarqa University.

##### *Theme 1: Knowledge and Understanding*

1.1 Describe the normal and diseased states of body structure and functions.

1.2 Explain the molecular, cellular, tissue, and organ changes that lead to pathophysiological consequences and clinical manifestations.

1.3 Understand the epidemiology, pathogenesis, clinical presentation, psychosocial impact, and prognosis of diseases related to dental practice.

1.4 Acquire adequate knowledge of the scientific foundation on which dentistry is based and a good understanding of various relevant scientific methods, principles of biological functions, and ability to evaluate and analyze scientifically various facts and data.

1.5 Develop adequate knowledge of the development, structure, and function of the teeth, mouth jaws, and associated tissues both in health and disease and their relationship and effect on the general state of health as well as bearing on the physical and social well-being of the patient.

1.6 Develop scientific principles of sterilization, disinfection and antisepsis, and infection control and demonstrate knowledge of the hazards of ionizing radiations and their effects on biological tissues, together with the regulations relating to their use, including radiation protection and dose reduction.

1.7 Value research methods and their applications and evidence-based dentistry.

1.8 Link the biomedical, physical, and behavioural sciences about oral health sciences and diseases to describe and use the healthcare system in Jordan, and support health promotion and disease prevention.

### ***Theme 2: Skills***

2.1 Obtain comprehensive history, perform a complete clinical examination, and conduct a patient-centred treatment plan while keeping confidentiality.

2.2 Develop sufficient commands to communicate with patients, families, staff, colleagues, and the community.

2.3 Integrate evidence-based scientific approach to practice with clinical reasoning, and decision-making and acquire the philosophy of lifelong learning, and accept professional development.

2.4 Perform variable dental procedures effectively and safely with due regard for the patient's comfort including emergency procedures applying behavioral management skills.

2.5 Demonstrate basic research skills and scholarly behaviors and understand basic principles of practice administration, and financial and personnel management in a dental practice.

2.6 Demonstrate skills to analyze oral health as it relates to symptoms, signs, and pathology and skills required to prevent, diagnose, and treat anomalies and illnesses of the teeth, mouth, jaws, and associated structures.

### ***Theme 3: Values***

3.1 Knowledge of the significance of collaboration between colleagues and the moral and ethical responsibilities involved in the provision of care to individual patients, populations, and communities.

3.2 Counsel and educate the patient effectively and prioritise the patient's needs and safety in the care process.

3.3 Demonstrate interpersonal skills, behaviour, ethical principles, and self-awareness of strengths and weaknesses as a health professional and willingness to refer.

## **V. CURRICULUM MAP AND REQUIREMENTS OF THE DDS PROGRAM**

A difficult but crucial tool for developing, reviewing, improving, and fine-tuning any curriculum is curriculum mapping[7,8]. Nonetheless, according to the literature, the majority of curriculum mapping efforts take place within a single institution[9,10]. To promote clarity about the teaching and learning process, educators have long embraced curriculum mapping as a tool. In its most basic form, it offers information sharing so that teachers and students can both be aware of what is taught and where in the curriculum. Our strategy is distinctive in that numerous organizations and professions with varied backgrounds contributed to the creation of

standardized generic curricula templates. This method also enabled the instructors of pre-clinical and clinical courses to view the curricula from a variety of perspectives and collaborate to create a functional model that was acceptable to all parties. Tables 3 to 7 show the curriculum map for the DDS program. Each year consists of three semesters (first, second, and summer) except the final year (year five) which has only the first and second semesters.

**Table 3: First Year Structure**

Course Title	Credit hours		
	Didactic	Practical	Total
Medical Physics	2	0	2
General and Organic Chemistry	3	1	4
Cytology and General Biology	3	1	4
Human Histology	3	1	4
Human Anatomy & Embryology	3	1	4
Human Physiology	3	1	4
Medical Biochemistry	2	0	2
Dental Anatomy	1	1	2
University Requirements	15	0	15
<b>Total</b>	<b>35</b>	<b>6</b>	<b>41</b>

**Table 4: Second Year Structure**

Course Title	Credit hours		
	Didactic	Practical	Total
Head and Neck Anatomy and Embryology	2	1	3
Medical Microbiology	3	1	4
Molecular Biology and Genetics	2	1	3
Oral Biology and Physiology	2	0	2
Dental and Oral Histology	1	1	2
Pathology	3	1	4
Pharmacology 1	2	0	2
Human Neuroanatomy	2	1	3
Dental Biomaterials 1	1	1	2
Dental Cariology	1	0	1
Medical Immunology	2	0	2
Bioinformatics	1	0	1
Oral Pathology 1	2	1	3
University Requirements	9	0	9
<b>Total</b>	<b>33</b>	<b>8</b>	<b>41</b>

**Table 5: Third Year Structure**

Course Title	Credit hours		
	Didactic	Practical	Total
Biostatistics and Scientific Research	3	0	3
Pharmacology 2	3	0	3
Dental Occlusion and Temporomandibular Joint disorders	1	1	2
Operative Dentistry 1 / Preclinical	1	1	2
Endodontics 1 / Preclinical	1	1	2
Removable Prosthodontics 1 / Preclinical	1	2	3
Oral Pathology 2	1	0	1
Psychology	1	0	1
Community Medicine and Epidemiology	2	0	2
Local anesthesia and pain control	2	0	2
Emergency care and First Aid	2	0	2
Basic Infection Control Measures	1	0	1
Operative Dentistry 2 / Preclinical	1	1	2
Orthodontics 1 / Preclinical	1	1	2
Fixed Prosthodontics 1 / Preclinical	1	2	3
Health Administration	1	0	1
Ethics & Jurisprudence	1	0	1
Introduction to Clinical Dentistry and Oral Diagnosis	1	1	2
Dental Radiology and Oral Photography 1	2	1	3
University Requirement	3	0	3
<b>Total</b>	<b>30</b>	<b>11</b>	<b>41</b>



**Table 6: Fourth Year Structure**

Course Title	Credithours		
	Didactic	Clinical	Total
Operative Dentistry 3 / Clinical	1	1	2
Endodontics 2 / Clinical	1	1	2
Fixed Prosthodontics 2 / Clinical	1	1	2
Pediatric Dentistry 1 / Clinical	1	1	2
Removable Prosthodontics 2 / Clinical	1	1	2
Periodontics 1 / Clinical	1	1	2
Dental Biomaterials 2	1	0	1
Oral & Maxillofacial Surgery 1/ Clinical	1	1	2
Oral Medicine 1 / Clinical	1	0	1
Internal Medicine for Dental Students	1	1	2
Operative Dentistry 4 / Clinical	1	2	3
Endodontics 3 / Clinical	0	1	1
Fixed Prosthodontics 3 / Clinical	1	1	2
Removable Prosthodontics 3 / Clinical	1	1	2
Periodontics 2 / Clinical	1	1	2
Pediatric Dentistry 2 / Clinical	1	0	1
Oral & Maxillofacial Surgery 2 / Clinical	1	1	2
Dental Radiology and Oral Photography 2	1	1	2
Oral Medicine 2 / Clinical	1	0	1
General surgery for dental students	1	1	2
Orthodontics 2 / Clinical	1	1	2
Community Dental Health	2	0	2
Preventive Dentistry	1	0	1
Geriatric Dentistry and Special Needs	1	0	1
Research project	1	0	1
<b>Total</b>	<b>25</b>	<b>18</b>	<b>43</b>

**Table 7: Fifth Year Structure**

Course Title	Credithours		
	Didactic	Clinical	Total
Operative Dentistry 5 / Clinical	1	1	2
Endodontics 4 / Clinical	1	1	2
Fixed Prosthodontics 4 / Clinical	0	1	1
Removable Prosthodontics 4 / Clinical	1	1	2
Periodontics 3 / Clinical	1	1	2
Oral & Maxillofacial Surgery 3 / Clinical	1	1	2
Orthodontics 3 / Clinical	1	1	2
Paediatric Dentistry 3 / Clinical	1	1	2
Comprehensive Clinical Dentistry 1	0	2	2
Oral Medicine 3 / Clinical	0	1	1
Operative Dentistry 6 / Clinical	0	1	1
Endodontics 5 / Clinical	0	1	1
Fixed Prosthodontics 5/ Clinical	0	1	1
Removable Prosthodontics 5 / Clinical	1	1	2
Periodontics 4 / Clinical	0	1	1
Oral & Maxillofacial Surgery 4 / Clinical	1	1	2
Orthodontics 4 / Clinical	0	1	1
Pediatric Dentistry 4 / Clinical	0	1	1
Comprehensive Clinical Dentistry 2	0	3	3
Oral Medicine 4 / Clinical	0	1	1
Emerging Trends in Dentistry and Clinical Management	1	0	1
Esthetic Dentistry	1	0	1
Implant Dentistry	1	0	1
<b>Total</b>	<b>12</b>	<b>23</b>	<b>35</b>

## VI. PROSPECTS AND CHALLENGES

We anticipate with optimism that our curriculum will provide our students with a comprehensive education and training that will confer on them the necessary skills and knowledge to excel in their profession. This is indeed one of the cardinal objectives of a good curriculum [11]. The major thrust of the curriculum is to in the long run, bring about improved oral health outcomes in the Jordanian population. We hope that our dental graduates will provide quality dental care, including preventive, diagnostic, and treatment services, thus addressing the oral health needs of individuals and communities in Jordan and beyond[12,13]. Again, in this ever-evolving world

where knowledge is dynamic, our curriculum seeks to foster and encourage research and innovation in the field of oral health and dentistry generally. It is designed to encourage our students to explore new treatment techniques, technologies, and methodologies, leading to advancements in dental practices and oral healthcare [14].

Here at Zarqa University, a high premium is placed on the employability of our graduates both within Jordan and abroad. Consequently, our dentistry curriculum is designed to produce highly skilled dentists who would benefit from numerous employment opportunities. As oral health awareness grows, the demand for dental professionals increases, creating a favourable job market for graduates. Because the health care system is team-based involving different professionals [15], our curriculum took that into account and built-in mechanisms to encourage interdisciplinary collaboration. Thus, our graduates will be well-equipped with the skills to collaborate with various healthcare professionals, such as oral surgeons, orthodontists, and periodontists. Our curriculum promotes interdisciplinary learning and enhances collaboration, enabling our dentists to work effectively in a multidisciplinary healthcare environment.

Luckily for us here at Zarqa University, some of the challenges faced by other dental schools do not apply in our case. For example, no matter the quality of a curriculum, there is a need for adequate infrastructure and resources before it can be effectively implemented. Limited resources and funding can pose challenges in establishing and maintaining the necessary infrastructure for practical training. Even though we currently have only the pioneer set of students, the University management has provided state-of-the-art dental clinics, laboratories, and simulation facilities in anticipation of the clinical training of the students.

Recruiting and retaining qualified faculty members with expertise in different areas of dentistry can also potentially be a major challenge. The availability of experienced dental educators and specialists may be limited, leading to potential gaps in curriculum delivery. In our Faculty, the University has already employed enough faculty members to deliver the basic medical component of the curriculum, and academic activities are already in top gear. Several clinical staff have also already been employed, including younger dentists who have been sent for further training to bolster the faculty's capacity.

No doubt the field of dentistry is a dynamic field, with new research and technological advancements constantly emerging. One important challenge is designing a curriculum that stays up-to-date with the latest developments and practices which also require regular updates and revisions. In our faculty, we have an in-built mechanism in the curriculum that allows us to modify and improve the content and delivery of the curriculum in line with the regulations of the relevant accreditation bodies.

We also recognize the need to expand the clinical exposure of our students and consider that in the development of the curriculum. However, access to patients and clinical settings may be a challenge due to the location of the University outside of the main city centre. Therefore, to ensure a robust clinical training component, we may require collaborations with other dental clinics and hospitals around Jordan, and will also carry out community outreach programs.

Another potential challenge we have noted is the need to constantly adhere to accreditation requirements and align the curriculum with professional guidelines. This is a complex process that would require careful planning and coordination. Luckily, there are standing committees both in the University and in the faculty that are continually trying to ensure that all conditions for obtaining and sustaining approval for the program are met.

We realise that the integration of technology such as digital imaging, Computer-aided design (CAD) and Computer-aided manufacturing (CAM) systems, and tele-dentistry as catered for in the curriculum might be a potential challenge, and we are already actively engaging the University on the need to increase resource allocation and faculty training in that regard.

## CONCLUSION

Finally, our curriculum has been designed to promote ethical and professional development by instilling ethical values and professionalism. Preparing students to adhere to ethical standards, maintain patient confidentiality, and navigate challenging ethical dilemmas requires a well-designed curriculum and dedicated faculty support and we are confident that ours will provide the enabling environment.

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## AUTHOR CONTRIBUTIONS

All authors participated in designing the program structure. The corresponding author wrote the initial draft of the manuscript and all authors revised the manuscript critically for important intellectual content and approved the final version of the article.

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