Unit Description Form

Course Description Form

Faculty of Engineering / Department of

Unit Information			
Course Information			

			Unit delivery
Unit Title	**Medical Physics**		
Unit Type	**fundamental**		نظريه ☒
Unit Code	BME-12-04		حاضر ☒
ECTS Credits	**8**		المختبر ☒
SWL (ساعة / SEM)	**105**		تعليمي ☐
			عملي ☐
			☐ Seminar

Unit level	1	Delivery Semester	2
Department of Administration	Biomedical Engineering	College	Faculty of Engineering
Unit Commander	Kawthar Ali Hassan	E-mail Address	kawther.ha@uowa.edu.iq
Title of Unit Commander	Assistant Lecturer	Unit Commander Qualifications	Master
Unit Teacher		E-mail Address	
Peer Reviewer Name	name	E-mail Address	E-mail Address
Date of accreditation of the Scientific Committee	26/9/2024	Version number	1.0

Relationship with other units			
Relationship with other subjects			
Prerequisites Unit		No	Semester
Common Requirements Unit		No	Semester

Unit objectives, learning outcomes and how-to contents Course objectives, learning outcomes and instructional contents	
Objectives of the Unit Course Objectives	• Understand the applications of physical principles in medicine such as radiology and magnetism. • Improve medical imaging techniques such as X-ray andMRI for accurate diagnosis. • Develop radiation therapy techniques to accurately treat tumors and reduce side effects. • Ensure patient safety by reducing unnecessary radiation doses. • Analyze computer data and models to improve treatment and medical monitoring. • Training students on the use and calibration of medical devices to ensure their accuracy. • Provide the fundamentals of physics for its medical applications in the safe and effective treatment and diagnosis.
Unit Learning Outcomes Learning outcomes of the course	1. Understand the physical principles in medical diagnosis and treatment. 2. Master medical imaging techniques such as X-ray and MRI. 3. Apply radiation therapy techniques accurately. 4. Ensure radiation safety for patients and staff. 5. Calibration of medical devices to ensure their accuracy. 6. Analyze data to improve diagnosis and treatment. 7. Apply practical skills in medical work environments. 8.
Indicative Contents Indicative Contents	1. Basic physical principles (X-ray, electricity, magnetism). 2. Medical imaging techniques (X-ray, MRI, CT). 3. Radiation therapy (IMRT, IGRT). 4. Radiation protection to reduce exposure. 5. Calibration and testing of medical devices. 6. Biological and radiological measurements. 7. Research and development in medical physics.

Learning and Teaching Strategies Learning and Teaching Strategies	
Strategies	Improve medical imaging techniques such as X-ray and MRI to reduce radiation dose and increase image resolution. Radiation therapy using precise techniques such as IMRT and IGRT to improve tumor targeting and reduce the impact on healthy tissue. Reduce radiation doses through precise guidance techniques and provide protection to patients. Quality control in medical devices and ensuring their efficiency and safety. Research and development of new technologies such as artificial intelligence and nanotechnology to improve treatments. All these strategies aim to improve treatment efficiency and ensure patient safety.

<table>
<tr><td colspan="4">Student Workload (SWL)
The student's academic load is calculated for 15 weeks</td></tr>
</table>

SWL منظم (h / sem) Regular academic load of the student during the semester	78	**SWL regulator(h/s)** Regular student load per week	5
SWL غير منظم (h / sem) Irregular academic load of the student during the semester	72	**Unregulated SWL (h/s)** Irregular student academic load per week	5
SWL إجمالى (h / sem) The student's total academic load during the semester			105

<table>
<tr><td colspan="6">Unit Evaluation
Course Evaluation</td></tr>
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	As	Time/Number	Weight (tags)	Week due	Related learning outcomes
Formative Assessment	**Contests**	2	10% (10)	5, 10	LO #1 , 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO #3 , 4, 6 and 7
	Projects /Laboratory.	1	10% (10)	continuous	every
	report	1	10% (10)	13	LO #5 , 8 and 10
Final Assessment	**Midterm Exam**	2 hr	10% (10)	7	LO #1-7
	Final Exam	2 hours	50% (50)	16	every
	Overall Rating		100% (100 degree)		

<table>
<tr><td colspan="2">Delivery Plan (Weekly Curriculum)
Theoretical Weekly Curriculum</td></tr>
</table>

week	Covered Material
Week 1	Introduction to Chemistry Preparation of solutions, molars, molars, reagents, acids
Week 2	Alkaline, dielectric solution, concentration, titration
Week 3	Proteins , protein metabolism , protein synthesis , protein catalysis , protein synthesis , protein fate , amino acids
Week 4	Amino acid reaction, the relationship of amino acids with other molecules Protein synthesis , translation , transcription , globulin , albumin
Week 5	Liver function tests, bilirubin, GOT and AST , ALP , kidney function tests, urea, creatinine and uric acid
Week 6	Lipid metabolism, lipid synthesis, lipid synthesis, alternative pathway, lipid degradation, fatty acids
Week 7	Midterm Exam

Week 8	Cholesterol, triglycerides, HDL , LDL , ketone bodies, bile salt, lipase
Week 9	Carbohydrates, glucose metabolism, glucose synthesis, glycolysis, inhibitory cycles, glycogen synthesis, glucose formation
Week 10	Diabetes, hyperglycemia, HbA1C , fasting glucose, fructose, sucrose, lactose
Week 11	Enzymes, Enzyme metabolism, Enzyme types, Enzyme function, Enzyme synthesis
Week 12	Liver enzymes, kidney enzyme, digestive enzyme, coenzyme, glycolysis enzymes
Week 13	Hormones Hormone Synthesis , Types of Hormones , Hormone Function , Hormone Receptors , Pituitary Hormones
Week 14	Thyroid hormones, Adrenal hormones, sex hormones, digestive hormones, pinal hormones
Week 15	DNA , RNA , guanine, thiamine, cytosine, adenine, uracil
Week 16	Preparatory week before the final exam

Learning and Teaching Resources Learning and Teaching Resources		
	text	**Available in the library?**
Required texts	Clinical Biochemistry, (8 editions), by Leipencotts	Yes
Recommended texts		Yes
Websites		

Grading chart Grading chart				
group	degree	Appreciation	Tags (%)	definition
An-Najah Group (50 - 100)	**A -** Excellent	privilege	90 - 100	Outstanding Performance
	B - Very Good	Very good	80 - 89	Above average with some errors
	C - Good	Good	70 - 79	Proper work with noticeable errors
	D - Satisfactory	medium	60 - 69	Fair but with significant shortcomings
	E - sufficient	Acceptable	50 - 59	The work meets the minimum standards
Group failure (0 – 49)	**FX -** Failed	Deposit (in (processing	(45-49)	More work required but credit granted
	F - Failed	Failure	(0-44)	Large amount of work required

Note: Signs that are more than 0.5 decimal places greater than or below the full mark will be rounded higher or lower (for example, a score of 54.5 will be rounded to 55, while a mark of 54.4 will be rounded to 54. The university has a policy of not tolerating "imminent traffic failure", so the only modification to the marks granted by the original mark(s) will be the automatic rounding described above.