جامعة الكفيل
University of Alkafeel

الخطة الدراسية

كلية طب الاسنان / جامعة الكفيل / العام الدراسي 2020 – 2021

المرحلة الدراسية:	الاولى
التخصص:	طب الاسنان
اسم المادة الدراسية باللغة العربية:	الفيزياء الطبية
اسم المادة الدراسية باللغة الإنجليزية:	Medical physics
اهداف المادة:	ان ممارسة الطب الحديث ترتكز بشكل فاعل على العديد من التقنيات والأدوات التي تعتمد على المبادئ الفيزيائية كأساس لعملها. ان استخدام هذه التقنيات يتطلب الدقة في طرائق التشخيص والعلاج لذا أصبح من الضروري تمكين الطالب من معرفة كل ما يتعلق بالجسم البشري من ناحية الوظائف الفيزيائية لأعضاء الجسم البشري والتطبيقات الطبية في التشخيص والعلاج من خلال التمكن النظري والعملي لمفردات المنهج.
وصف المادة:	معرفة وفهم علاقة الفيزياء بالإنسان والتأثيرات الفيزيائية على الجسم البشري تشخيصا وعلاجا وعلاقة كل هذه المعلومات بصحة الانسان عن طريق المحاضرات والمناقشة لترسيخ الأفكار والتجارب المختبرية واعداد التقارير .
عدد الساعات النظرية:	60
عدد الساعات العملية:	60
عدد الوحدات:	6
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المنهج المقرر / الجزء النظري:

Week	Syllabus
1	Heat and cold in medicine: Temperature scales, thermography, Heat lost by (radiation, convection, evaporation of sweat and respiration).
2	Heat therapy
3	Cryosurgery

4	Forces on & in body: a- Static forces: (type of levers with medical examples). b- Dynamic forces * (Centrifuge).
5	Physics of the skeleton: a- Bones : (Function of bones, Composition of bone, bone remodeling, b- Compact and trabecular bone. c- Stress-strain curve: (compressive and tensile stress, young modulus). d- Bone Joints: (synovial fluid, coefficient of friction of a joint).
6	Light in medicine: a- Properties of light, measurement of light and its units. b- Applications of visible light in medicine (endoscope). c- Applications of ultraviolet and infrared light in medicine.
7	Laser in medicine. Applications of microscopes in medicine.
8	Energy, Work and Power of the body: First law of thermodynamic. Energy change in the body (Met, Basal metabolic rate (BMR). Work and power. Efficiency heat losses from the body. Anaerobic phase and aerobic phase. Hypothalamus (body's thermostat).
9	Physics of eyes and vision: a- Focusing elements of the eye (cornea, lens). b- Element of the eye (pupil, aqueous humor, vitreous humor, sclera). c- Retina (size of image in retina, rods and cons, dark adaptation). d- Visual acuity, Snellen chart, optical density.

10	e- Defective vision, audits correlation (short and long sight, Astigmatism, contact lenses, glasses prescription. f- Color vision and chromatic aberration (color blindness, Purkinje effect, and ocular chromatic aberration). Ophtalmoscope.
11	Pressure: a- Definition, absolute pressure, gauge pressure, negative pressure, unit of Pressure. b- Measurement of pressure in the body(Manometer). c- Pressure inside the skull. d- Eye pressure. e- Pressure in the skeleton. f- Pressure in the urinary bladder. g- Boyle's law: (pressure while diving). HOT (hyperbaric oxygen therapy).
12	Electricity within the body: a- Electrical potential of nerves (resting potential, action potential in myelinated and unmyelinated nerves). b- Electromyogram (EMG). c- Electrical potential in the heart (electrocardiogram ECG). d- Electroencephalogram (EEG).
13	e- Cardiovascular instrumentation (electrodes, amplifiers, monitoring, defibrillators, pace makers).

	f- Application of electricity (macro and micro electrical shock, high frequency electricity in medicine). g- Short wave diathermy (capacitance and inductance method). h- Microwave diathermy (characteristics, interaction with tissues).
14	Physics of cardiovascular system: a- Work done by the heat. b- Blood pressure and its measurement (indirect measurement, sphygmomanometer). c- Pressure across the blood vessel wall (Laplace wall).
15	d- Bernoulli's principle applied to the cardiovascular system. e- Poiseuilles equation, laminar and turbulent flow, viscosity, Renyolds number. f- Physics of cardiovascular diseases.
16	Physics of the ear and hearing: a- Structure of the ear (outer ear, middle ear, inner ear). b- Sensitivity of the ears.
17	Sound in medicine: a- Properties of sounds. b- Stethoscope (including heart sound).
18	Ultrasound (A-scan, B-scan, M-scan and Doppler effect). d- Physiological effects of ultrasound in therapy.
19	Physics of the lung and breathing: a- Function of the breathing system. b- The airways (the alveoli, the function of airways).
20	c.Gases exchange in the lungs (ventilation, perfusion, Dalton law, Henry law, diffusion of gases, oxygen saturation curve).

	d- Measurement of lung volumes (spirometer).
21	e- Pressure airflow volume relationship of the lungs. f- Compliance. Surface tension (physics of alveoli, Laplace law).
22	g- Eating mechanism, airways resistance, work of breathing. h- signs of lung diseases.
23	Physics of diagnostic X-ray: a- Properties of X-ray, production of X-ray. b- Absorption of X-ray, contrast media
24	X-ray image (penumbra, grid, intensifying screens). d- Radiation to patients from X-ray (filters).
25	Physics of nuclear medicine: a- Radioactivity decay, half-life, units.
26	b- Basic instrumentation and its medical applications (GM-tube, photomultiplier tube, scintillation detector, solid state detector).
27	c- Therapy with radioactivity. d- Radiation doses in nuclear medicine.
28	Physics of radiation therapy: a- The dose units (Rad and Gray). b- Principles of radiation therapy. c- Brach therapy, quality factor (QF).
29	Pollution: a- Natural occurrence of radioactive materials (Radon gas). b- Biological effects of ionizing radiation.
30	Radiation protection. d- Radiation detection.

المنهج المقرر / الجزء العملي:

Week	Syllabus
1	1. Explain how to plot graph and make laboratory report. 2. The scientific notation 3. Conversion of units
2	temperature and thermometers
3	Thermocouple, measurment human temperature by it.
4	Diffraction grating
5	Laser He-Ne, calculate the wave length for it.
6	Pressure and Blood pressure
7	Abbe-Refractometer
8	The Focal Length Converging Lens (Displacement Method)
9	Determine the Specific Rotation of Sugar Solution by Polarimeter
10	Ohm's law
11	Measurement of A.C. voltage with the cathode ray oscilloscope (CRO)
12	Measurement of D.C. voltage with the cathode ray oscilloscope (CRO)
13	Viscosity of liquids .
14	The fall of a body through a viscous medium
15	To show that a small sphere falls with a constant terminal velocity

المصادر:

المراجع الرئيسية:

[1] Medical physics / John R. Cameron

[2]

[3]

المراجع المساعدة:

[1] The Physics of Radiation Therapy: Mechanisms, Diagnosis, and Management / Faiz Khan

[2]

[3]