

BME352 Cardiovascular Bioengineering

Level: 3

Credit Units: 5 Credit Units

Language: ENGLISH

Presentation Pattern: EVERY JAN

Synopsis:

BME352 provides engineering students with basic understanding of cardiology concepts with applications in cardiac diagnostic imaging, cardiac device treatment and cardiac rehabilitation. It will also allow students to obtain advanced engineering knowledge, including theoretical modeling and mathematical simulation techniques, in diverse cardiac conditions. The course is suitable for students who want to pursue a career in cardiovascular research, biomedical engineering or related professions.

Topics:

- Anatomy and physiology of heart
- Cardiac pumping function and assessment
- Cardiac mechanics
- Arterial haemodynamics
- Basic electrophysiology and introduction to pacemaker and defibrillator
- Cardiac fitness and rehabilitation

Textbooks:

Liang Zhong, Ru San Tan, Eddie Yin-Kwee Ng, Dhanjoo N Ghista: Computational and Mathematical Methods in CardioVascular Physiology World Scientific
ISBN-13: 9789813270657

Learning Outcome:

- Illustrate the macroscopic and microscopic structure of heart, the cardiac cycle, cardiac electrical activity, ECG vector calculation, excitation-contraction coupling and cardiac imaging modalities
- Examine cardiac function as assessed by pressure-volume loops, cardiac function curves and appreciate the nature of fluid dynamics (Bernoulli relationship, Newton rule, resistance)
- Appraise the field of cardiac mechanics including current research problems and clinical applications
- Determine the activation, active force generation, ventricular-vascular coupling, aortic pressure determination, active elastance derivation and models of cardiac muscle behavior
- Propose different cardiac monitoring devices (echocardiography, CT, MRI and SPECT) to assess ventricular function and dysfunction
- Recommend and deliver cardiac rehabilitation
- Assess cardiovascular imaging modalities such as echocardiography, CT, MRI and nuclear cardiac imaging
- Demonstrate the required skills in cardiovascular bioengineering, imaging modalities and cardiac monitoring devices

Assessment Strategies - Regular Semester (Evening Class):

Components	Description	Weightage Allocation (%)
Overall Continuous Assessment	PRE-CLASS QUIZ 1	2
	PRE-CLASS QUIZ 2	2
	PRE-CLASS QUIZ 3	2
	QUIZ 1	12
	LAB REPORT 1	12
Overall Examinable Components	Written Exam	70
Total		100

*The information listed is subject to review and change.