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| Module Code | EEU33BM1 |
| Module Name | Anatomy and Physiology |
| ECTS Weighting¹ | 5 ECTS |
| Semester taught | Semester 1 |
| Module Coordinator/s | Marie-Victoire Guillot-Sestier |

Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline

On successful completion of this module, students should be able to:

1. Describe the basic functions of the human physiological systems.
2. Describe the morphological characteristics of mammalian cell types.
3. Explain the functional roles of these cell types and how their form fits their function.
4. Appreciate how these cells interact in the various organ systems.
5. Explain the homeostatic mechanisms of each organ system (you should be able to give examples).
6. Differentiate normal and pathological anatomy and physiology.
7. Explain the mechanisms of disease (e.g. diabetes, neurodegeneration etc.).
8. Be familiar with the diagnostic procedures and medical interventions for diseases.
9. Analyse the BMS material and integrate with information from their own discipline.

Graduate Attributes: levels of attainment

To act responsibly - Introduced

To think independently - Enhanced

To develop continuously - Enhanced

To communicate effectively - Introduced

¹ [TEP Glossary](#)

Module Content

Introduction: Integration of organ function, levels of biological organization, concepts of form fitting function, homeostasis (mechanisms of control and disturbances).

Cells, Tissues, Organs: the cell theory, the cell as a basic unit of life, cellular ultrastructure, intracellular organelles, cellular function in health and disease.

Blood: composition, function of plasma proteins, cellular component of blood, haemoglobin and oxygen transport, role of white blood cells in immunity, blood clotting, blood pathology (anaemia, abnormal clotting).

The Immune System: sources of immune challenges, immunological memory and specificity, mediators of immunity, immune responses, antibodies, self-tolerance, blood typing, immune system pathology.

The Cardiovascular and Respiratory System: components, path of blood flow through the system, anatomy of heart, heart rhythms, regulation of heart, blood vessel anatomy, blood flow to organs, anatomy of the respiratory system, mechanics of breathing, gas transport.

The Excitable Tissues - Brain and Muscle: divisions of the nervous system, basic brain anatomy and physiology, electroencephalogram (EEG), spinal cord, reflexes, neural cell form and function, neural communication, neurogenesis and neurodegeneration, muscle tissue types, muscle contraction, communication systems in muscle, neural muscular junction, physics of joint movement, muscle metabolism, muscle fibre types, adaptive changes in muscle.

Bone and Cartilage: functions, types, anatomy, extracellular matrix composition, cellular component, growth and repair, skeletal pathologies, concept of bone as an organ, pathologies of bone and cartilage.

The Endocrine System: components, functions, control systems, abnormal endocrine function, pancreatic hormones, insulin, diabetes.

The Renal and Digestive Systems: components, function, micturition, renal functional units (the nephron), renal processes (filtration, reabsorption, secretion), water balance, renal pathology, digestion (absorption, motility, secretion), accessory organs (pancreas, liver).

Specialist lectures (e.g.):

Paediatric diabetes patients- benefits of technology, Orthopaedics, Cancer, Histopathology.

Teaching and Learning Methods

Lecture recordings and notes as well as supplemental learning material will be uploaded on Blackboard. Dates on the appendix table indicate when the lecture recording will be available to the students. A Laboratory demonstration covering basics of Physiological Principles of Muscle will be available online.

The module aims to give an introduction to human biology and disease, such that students can appreciate the basis for scientific/technical

procedures in the diagnosis, treatment and basic research associated with human disease. A basic understanding of terminology and practice is emphasized.

The lecture series will outline the physiology and anatomy of the main body systems and introduces the cellular basis of these systems. Some principles of disease conditions will be covered. The specialist lectures will provide an insight into the role of various technologies in the diagnosis and management of patients. Additionally they will show the integration of basic sciences, technology and clinical medicine across the continuum of care.

The module is aimed at students who have no prior knowledge of physiology and or biology. In addition to Undergraduate Engineering students, the following MSc programmes participate in the module: Bioengineering and Medical Device Design.

COVID-19 CONTINGENCY PLAN

In case of full lockdown, all lectures, lab demonstration and additional learning materials will be delivered online through blackboard. Final exam will be conducted online through Blackboard.

Appendix: Anatomy and Physiology timetable

| Date | Time | Topic, speaker |
|--------------------------|-------|--|
| 2 nd October | 2-6pm | <p>Introduction to Module</p> <p>Cells, Tissues & Organs Dr Marie-Victoire Guillot-Sestier</p> <p>The Immune System & Blood Dr Marie-Victoire Guillot-Sestier</p> |
| 9 th October | 2-6pm | <p>Specialist Lecture: Minimally invasive treatment Dr Conor Harkin (TBC)</p> |
| | | <p>Endocrine System Dr Marie-Victoire Guillot-Sestier</p> |
| 16 th October | | <p>Specialist Lecture: Nanodiagnostics Prof Adriele Prina-Mello (TBC)</p> |

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| | 2-6pm | |
| | | Cardiovascular System Dr Marie-Victoire Guillot-Sestier |

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| 23rd October | 2-6pm | Specialist Lecture: Cancer Dr Martin Barr Introduction to the Brain Dr Marie-Victoire Guillot-Sestier |
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| 6th November | 2-6pm | Connective tissues Dr Marie-Victoire Guillot-Sestier |
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| 20th November | 2-6pm | The Digestive System Dr Marie-Victoire Guillot-Sestier Bone, Cartilage, Muscle Dr Marie-Victoire Guillot-Sestier |
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| 27th November | 2-6pm | Specialist Lecture: Paediatric diabetes patients Prof Edna Roche The Renal System Dr Marie-Victoire Guillot-Sestier |
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| 4th December | 2-4pm | Respiratory System Dr Marie-Victoire Guillot-Sestier |
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| 11 th December | 2-5pm | Laboratory class Physiological Principles of Muscle |
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| Assessment Details ² Please include the following: | Assessment Component | Assessment Description | LO Addressed | % of total | Week due |
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| <ul style="list-style-type: none"> • Assessment Component • Assessment description • Learning Outcome(s) addressed • % of total • Assessment due date | Summative – Written Examination (100%) This course will be assessed via a written examination. The duration of the examination will be 2 hours. | <i>Time-Limited Take-Home Examination:</i> <i>An online exam conducted through Blackboard. Students will be given a 24 hour period in which to complete the examination but once started, must complete the examination in 2h.</i> A written section consisting of 2 short essay questions out of a choice of 3 (1000 words max per question). | 1-9 | 100 | January 2021 (date to be confirmed). Online through blackboard. |
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| Reassessment Requirements | | | | | |

² [TEP Guidelines on Workload and Assessment](#)

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| Contact Hours and Indicative Student Workload² | <p>Contact hours/ Online Lectures: 33</p> <hr/> <p>Independent Study (preparation for course and review of materials): 72.5</p> <hr/> <p>Independent Study (preparation for assessment, incl. completion of assessment): 75.5</p> |
| Recommended Reading List | <p>Human Physiology (Primary) by Lauralee Sherwood 2010 Brooks & Cole.</p> <p>Fundamentals of anatomy & physiology by Martini, Nath & Bartholomew</p> <p>Wheater's functional histology: a text & colour atlas by Burkitt, Young & Heath</p> <p>Essential cell biology by Bruce Alberts et al.</p> <p>Gray's anatomy for students by Drake et al.</p> |
| Module Pre-requisite | |
| Module Co-requisite | |
| Module Website | |
| Are other Schools/Departments involved in the delivery of this module? If yes, please provide details. | <p>School of Medicine, Department of Physiology</p> |
| Module Approval Date | |
| Approved by | |
| Academic Start Year | |
| Academic Year of Date | |