

### 3.3.2 Minor in Engineering Materials

[Administered jointly by the Faculty of Engineering (Department of Materials Science & Engineering) and the Faculty of Science]

Engineering materials have played a key role in shaping the evolution of the industry in the past. All the more so, in recent times, materials played a catalytic role in influencing the technological advancement and economic growth of nations. It is not a coincidence that the most advanced nations of the world are also most advanced in the know-how of materials, which ranges from synthetic to biological materials. Rapid strides in advancement in cutting-edge technologies, whether related to life sciences such as in biomaterials, or engineering such as in thin films, are dependent on the further growth in the knowledge related to materials. Some of the materials-sensitive technologies include Bioengineering, Nanotechnology, Information Technology and Wafer Level Packaging. In order to align ourselves with most of the leading economies and universities of the world, it is imperative that we create a network of programmes that drive our students into the world of engineering materials.

The objectives of this multidisciplinary minor programme are as follows:

- To equip students with the fundamentals related to engineering materials, placing particular emphasis on advanced materials, design, manufacturing and processes,
- To enable students to be more aware of the behaviour of materials in engineering applications, and
- To enable students to select the materials for various engineering applications.

#### Requirements

To satisfy the Minor in Engineering Materials, a student must read materials related modules equivalent to at least 24 MCs, including the 8 MCs earned from the two core modules [(MLE1101 or ME2151) and MLE2101)], and at least two advanced elective modules (Level-3000 and Level-4000). In addition, the student has to select one of three tracks offered, namely, Biomedical and Polymeric Materials, Electronic Materials, and Structural Materials. Modules to be taken, other than the core modules, must be selected from the basket of modules listed under the appropriate track:

##### Biomedical and Polymeric Materials

BN3301 Introduction to Biomaterials

BN4301 Principles of Tissue Engineering

CN4203 Polymer Engineering

CM3264 Petroleum and Industrial Organics

CM4262 Advanced Materials Characterisation Techniques

CM4264 Speciality Polymers: Synthesis, Characterisation and Applications

CM4265 Polymer Blends and Composites

MLE3104 Polymeric and Composite Materials

MLE4202 Selected Advanced Topics on Polymers  
MLE4203 Polymeric Biomedical Materials  
ME4253 Biomaterials Engineering

#### Electronic Materials

CM3263 Chemistry of Semiconductors  
CN4216 Electronic Materials Science  
CN4217 Processing of Microelectronic Materials  
CN4223 Microelectronic Thin Films  
EE4411 Silicon Processing Technology  
MLE2105 Electronic Properties of Materials  
MLE3105 Dielectric and Magnetic Materials  
MLE4207 Growth Aspects of Semiconductors  
PC3235 Solid State Physics 1  
PC3241 Solid State Devices  
PC3242 Physics of Semiconductor Processing  
PC4240 Solid State Physics 2  
PC4253 Thin Film Technology  
PC4259 Surface Physics  
PC4264 Advanced Solid State Devices

#### Structural Materials

CE2164 Structural Design and Materials  
CE3166 CE Materials and Structural Steel Systems  
CE5604 Advanced Concrete Technology  
ME3251 Materials for Engineers  
ME4251 Thermal Engineering of Materials  
ME4254 Materials in Engineering Design  
ME4255 Materials Failure  
MLE2102 Thermodynamics and Phase Diagrams  
MLE2104 Mechanical Properties of Materials  
MLE2106 Metallic Materials and Processing  
MLE2107 Ceramic Materials and Processing  
PC4259 Surface Physics

More details on the programme can be found at: [www.eng.nus.edu.sg/minor/materials](http://www.eng.nus.edu.sg/minor/materials)