

# IMPERIAL

## Mechanical Engineering

*Mechanical Engineering is key to addressing modern technological and societal challenges, driving innovation across a broad range of applications:*

### Safety

fires, ventilation,  
emissions, forensic,  
aerosols, noise,  
pollution, satellites,  
imaging, inspection,  
defence

### Transportation

aircraft, space,  
automotive,  
emissions, batteries,  
hybrid thermal/electric,  
decarbonization,  
turbomachinery

### Energy

hydrogen, nuclear,  
storage/batteries,  
fuel cells,  
wind turbines,  
future fuels,  
harvesting, emissions,

### Healthcare

surgery,  
implants,  
medical imaging,  
robotics,  
wearables,  
sports

### Manufacturing

food processing,  
additive manufacture,  
forming, welding  
robotics,  
satellite,  
defence

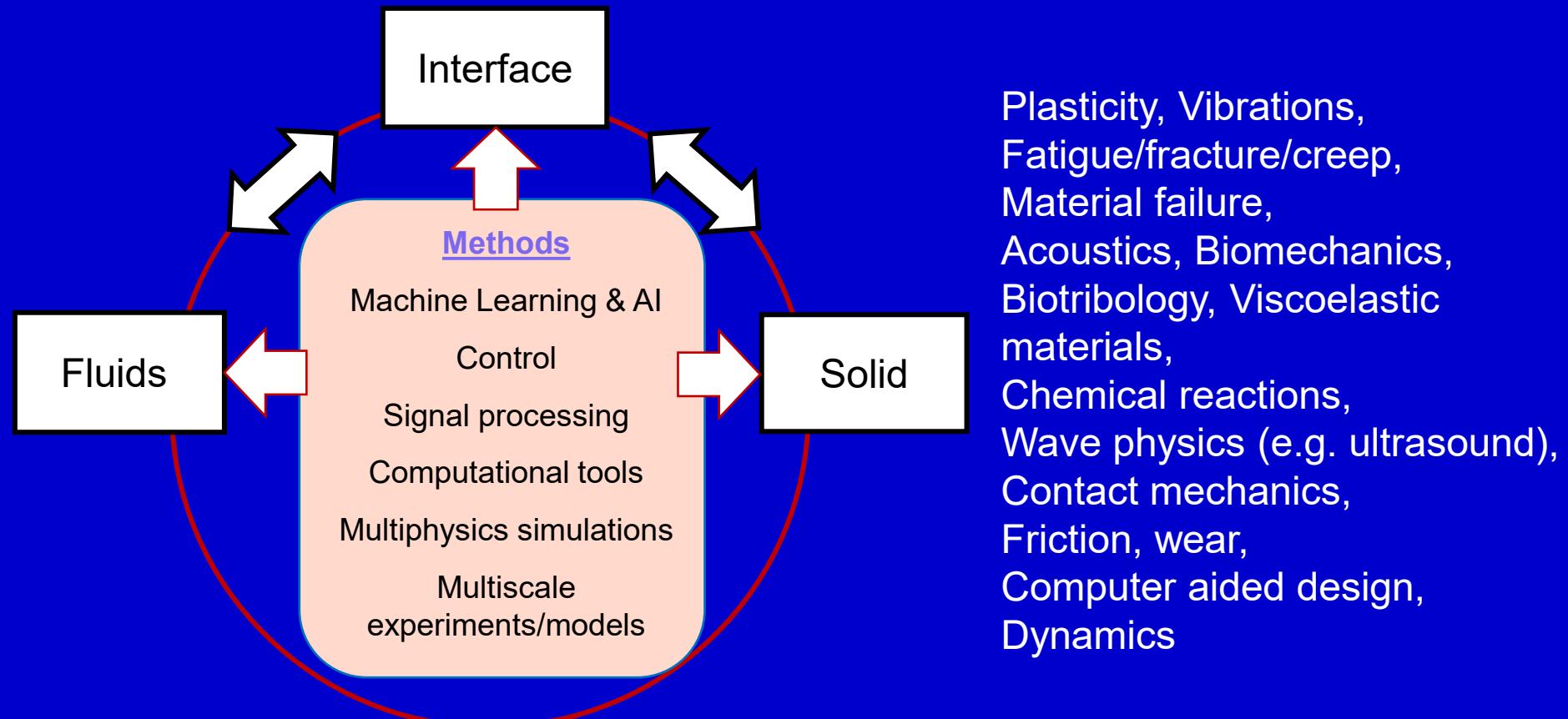
# IMPERIAL

## Mechanical Engineering

*Innovations are underpinned by core scientific and engineering principles...*

Aeroelasticity, Aero-dynamics, Heat transfer, Thermodynamics, Lubricants,  
Electrochemistry, Boundary layers, Solid-liquid interfaces, Tribology

Acoustics, Chemical reactions, Multi-phase flows, Fluid dynamics, Molecules/chemistry



# IMPERIAL

Mechanical Engineering

*The department integrates advanced technologies and methodologies across a range of strategic research areas, including:*

- *Future Transport*
- *Sustainable energy*
- *Healthcare*

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Mechanical Engineering

*Future Transport applications:*



**Net Zero Transportation**

Electrical power unit  
Batteries  
Energy infrastructure  
Energy storage  
Sustainable fuels  
Hydrogen



**Hybrid Thermo-Electric propulsion**

Propellers  
Turbomachinery  
Aeroelasticity  
Lubrication  
Additive manufacturing  
Composites & adhesives



**Safety**

Fire safety  
Noise and vibration  
Pollutants  
Circular economy  
Policy



**Intelligent Networks**

Smart Sensors  
Autonomous Systems  
Robotics  
Digital Twin  
Techno-economics  
Enterprise

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Mechanical Engineering

*Sustainable Energy applications:*



## Carbon Capture Utilisation & Storage

Net-zero  
Nuclear energy  
Fluid regeneration  
Waste management



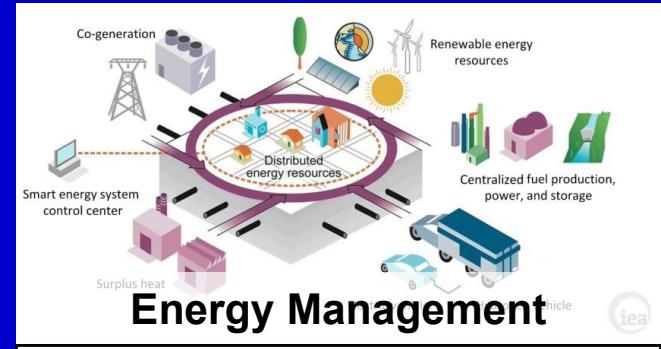
## Energy Storage

Thermal power unit  
Sustainable fuels  
Hydrogen  
Batteries  
Electrical power units



## Energy Conversion & Recovery

Turbomachinery  
Heat Recovery  
Fuel cell  
Smart Systems  
Supercritical System



Techno-economics  
Energy infrastructure  
Pollutants  
Circular economy  
Policy

# IMPERIAL

## Mechanical Engineering

### *Healthcare applications:*



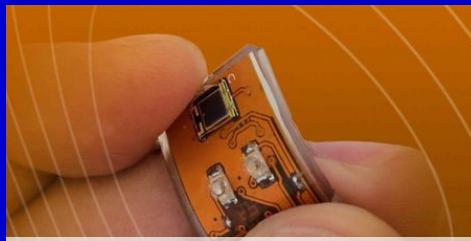
#### Robotics

Soft-robotics  
Neurosurgery  
Orthopaedics  
Steerable needles  
Nanobots



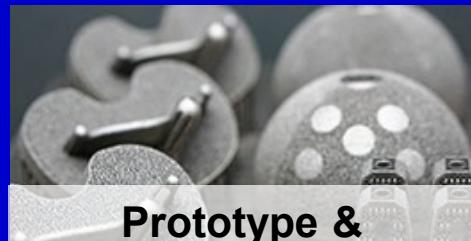
#### Imaging

Ultrasound  
CT  
MRI  
Intraoperative  
Data Fusion



#### Sensing

Wearables  
Implants  
Surgical robots  
Surgical tools  
Textiles



#### Prototype & Manufacture

Surgical robots  
Surgical tools  
Medical devices  
Implants  
Orthopaedics  
Neurosurgery



#### Pre-clinical Testing

Surgical robots  
Implants  
Simulated surgery  
ISO tests  
Orthopaedics  
Neurosurgery