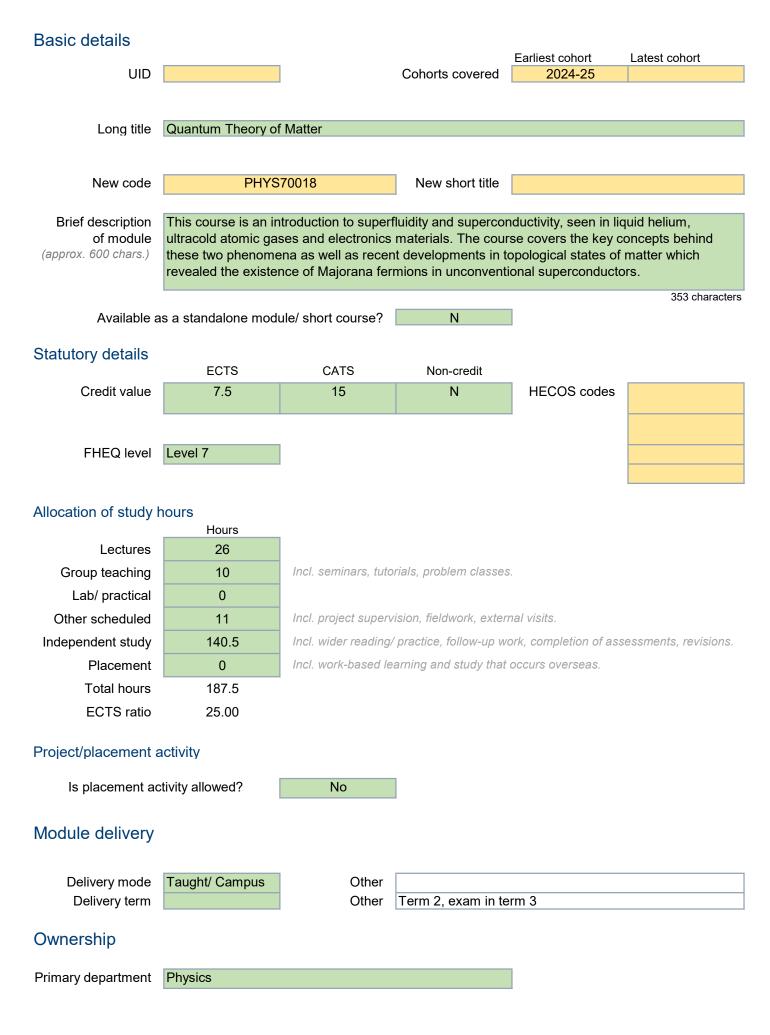
## Imperial College London

# Module Specification (Curriculum Review)



Additional teaching departments	None
Delivery campus	South Kensington
Collaborative deliv	very
	Collaborative delivery? N
External institution External department	N/A N/A

### Associated staff

External campus

N/A

Role	CID	Given name	Surname
Module Leader		Derek	Lee
Module Leader		Frank	Schindler

# Learning and teaching Module description

Learning outcomes	At the end of the course, the student should: (1) understand the phenomenology of superfluids and conventional superconductors, including Ginzburg- Landau theory (2) understand the basic formalism of second quantisation (2) understand the microscopic theory of neutral superfluids: Bogoliubov theory (3) understand the BSC theory of superconductors (4) understand the Bogoliubov-de-Gennes formalisms for quasiparticles in superconductors (5) understand examples in topological superconductors, e.g. Majorana fermions in Kitaev chain and p+ip superconductors
Module content	<ul> <li>1.Phenomenology of neutral superfluids (liquid helium, ultracold gases): superfluidity, quantised vorticity</li> <li>2.Phenomenology of conventional superconductors: Meissner effect, vortex lattices, dc Josephson effect2.Microscopic theory of superfluids and superconductors</li> <li>a.Second quantisation using sound waves as the canonical example</li> <li>b.Microscopic theory of quantum Bose fluid: Bogoliubov theory</li> <li>c.Microscopic theory of superconductors</li> <li>BCS theory for conventional (s-wave) superconductors</li> <li>Bogoliubov-de Gennes theory of BSC quasiparticles</li> <li>3.Topological superconductivity:</li> </ul>
Learning and Teaching Approach	Lectures complemented by office hours and rapid feedback sessions to assist learning via problem sheets.

Assessment Strategy	Final written exam of 2 hours.
Feedback	Rapid feedback session weekly with a demonstrator to assist with the problem sheets as well as lecture content.
Reading list	<ul> <li>J Annett, "Superconductivity, superfluidity and condensates" (OUP)</li> <li>Bernevig &amp; Hughes, "Topological insulators and topological superconductors".</li> </ul>
Quality assuranc	e Office use only

Date of first approval Date of last revision Date of this approval		QA Lead Department staff Date of collection	
Module leader	Derek Lee	Date exported Date imported	
Notes/ comments			

Template version 16/06/2017

### Programme structure Associated modules

UID	Legacy code	Module title	Requisite type

### Assessment details

Grading method Numeric

Pass mark 50%

#### Assessments

Assessment description	١	Neighting	Pass mark	Must pass?
2 hour written examination.		100%	50%	Ν
	Assessment description         2 hour written examination.			Assessment description Weighting mark 50%