

Course timetable and reading materials for PHYS2041/2941/7141, Semester 2, 2023

Week 1. Module 1: The Wave Function.		
Wed (12:00-2:00pm; 1-E215)	26 July	Workshop 1: <ul style="list-style-type: none"> • Lecture 1: Three failures of classical physics and Quantum Physics in a nutshell. [PHYS1002 textbook, Knight's "Physics for Scientists and Engineers", Chapters 37 and 38, especially Ch. 38] • L2: The wave function. The (time-dependent) Schrödinger equation. [Griffiths, Ch. 1.1-1.3]
Thu, Fri		Tutorial 1
Week 2. Module 1: The Wave Function.		
Wed	2 Aug	Workshop 2: <ul style="list-style-type: none"> • L3: Normalisation. Expectation values. [Griffiths, Ch. 1.1 - 1.5] • L4: Measurement. Momentum. The Heisenberg uncertainty principle [Griffiths, Ch. 1.5-1.6]
Thu, Fri		Tutorial 2
Week 3. Module 1: The Wave Function; Module 2: Time-Independent Schrödinger Equation.		
Wed	9 Aug	Workshop 3: <ul style="list-style-type: none"> • L5: Time-dependent Schrödinger equation (again): worked examples and some physical implications. [Griffiths, Ch. 1] • L6: Time-independent Schrödinger equation. Stationary states. [Griffiths, Ch. 2.1]
Wed	9 Aug	Assignment 1 due 5:00pm (assignment problems are from Tutorials 1 and 2)
Thu, Fri		Tutorial 3
Week 4. Module 2: Time-Independent Schrödinger Equation.		
Mon, make-up lecture	14 Aug, in 03-262, 1:00pm-3:00pm	Workshop 4: <ul style="list-style-type: none"> • L7: Particle in an infinite square well. Part I: Energy Eigenfunctions and Eigenvalues. [Griffiths, Ch. 2.2] • L8: Particle in an infinite square well. Part II: Orthogonality, Completeness and Superpositions. [Griffiths, Ch. 2.2]
Thu, Fri		Tutorial 4
Week 5. Module 2: Time-Independent Schrödinger Equation.		
Wed	23 Aug	Workshop 5: <ul style="list-style-type: none"> • L9: Harmonic Oscillator. Part I: General features and the analytic method. [Griffiths, Ch. 2.3 and Section 2.3.2, in particular] • L10: Harmonic Oscillator. Part II: The algebraic method of ladder operators. [Griffiths, Ch. 2.3.1]
Wed	23 Aug	Assignment 2 due 5:00pm (assignment problems are from Tutorials 3 and 4)
Thu, Fri		Tutorial 5
Week 6. Module 2: Time-Independent Schrödinger Equation.		
Wed	30 Aug	Workshop 6: <ul style="list-style-type: none"> • L11: The free particle. Fourier transforms. [Griffiths, Ch. 2.4] • L12: The Dirac delta-function. The delta-function potential. [Griffiths, Ch. 2.5]
Thu, Fri		Tutorial 6
Week 7. Module 2: Time-Independent Schrödinger Equation; Module 3 – Formalism.		
Wed	6 Sep	Workshop 7: <ul style="list-style-type: none"> • L13: The finite square well. [Griffiths, Ch. 2.6] • L14: Formalism: Hilbert Space. Matrix Mechanics. Dirac Notation. [Griffiths, Ch. 3.1, 3.6]
Wed	6 Sep	Assignment 3 due 5:00pm (assignment problems are from Tutorials 5 and 6)
Thu, Fri		Tutorial 7
Week 8. Module 3: Formalism.		
Wed	13 Sep	Workshop 8: <ul style="list-style-type: none"> • L15: Hermitian Operators. Observables. Eigenfunctions of Hermitian Operators. [Griffiths, Ch. 3.2, 3.3] • L16: Generalised Statistical Interpretation. Heisenberg Uncertainty. Heisenberg Equation. [Griffiths, Ch. 3.4, 3.5]
Thu, Fri		Tutorial 8
Week 9. Module 4: Quantum Mechanics in Three Dimensions.		
Wed	20 Sep	Workshop 9: <ul style="list-style-type: none"> • L17: Quantum Mechanics in 3D. Motion in a spherically symmetric potential. [Griffiths, Ch. 4.1] • L18: The hydrogen atom. [Griffiths, Ch. 4.2]
Wed	20 Sep	Assignment 4 due 5:00pm (assignment problems are from Tutorials 7 and 8)
Thu, Fri		Tutorial 9
MID-SEMESTER BREAK		

Week 10. Module 4: Quantum Mechanics in Three Dimensions.		
Wed	4 Oct	Workshop 10: <ul style="list-style-type: none"> • L19: Orbital angular momentum: General. [Griffiths, Ch. 4.3] • L20: Orbital angular momentum: Ket notation and the algebraic method of ladder operators. [Griffiths, Ch. 4.3]
Thu, Fri		Tutorial 10
Week 11. Module 4: Quantum Mechanics in Three Dimensions.		
Wed	11 Oct	Workshop 11: <ul style="list-style-type: none"> • L21: Spin (the intrinsic angular momentum). [Griffiths, Ch. 4.4] • L22: Spin $\frac{1}{2}$. Pauli spin matrices. General spin state in different bases. [Griffiths, Ch. 4.4]
Wed	11 Oct	Assignment 5 due 5:00pm (assignment problems are from Tutorials 9 and 10)
Thu, Fri		Tutorial 11
Week 12. Module 5: Identical Particles.		
Wed	18 Oct	Workshop 12: <ul style="list-style-type: none"> • L23: Many-particle systems and the Principle of Indistinguishability of Identical Particles. Bosons and Fermions. [Griffiths, Ch. 5.1 and 4.4.3] • L24: Addition of angular momenta (of two spins). Spin singlet and triplet states. Atoms, electronic configurations & spectral terms. [Griffiths, Ch. 5.2 and 4.4.3]
Thu, Fri		Tutorial 12
Week 13. Revision		
Wed	25 Oct	Workshop 13: <ul style="list-style-type: none"> • Revision lecture • Solving sample problems from past Final Exams
Wed	25 Oct	Assignment 6 due 5:00pm (assignment problems are from Tutorials 11 and 12)
Thu, Fri		Tutorial 13 - Revision tutorial