Caltech

Undergraduate Admissions and Financial Aid

Frequently Asked Questions about the Transfer Examinations

What topics are covered on the Transfer Examinations?

Physics:

Newtonian mechanics (motion, vectors, trajectories, Newton's laws, forces), work and energy, energy conservation, momentum, rigid rotations, angular momentum, harmonic motion, resonance, gravity, Kepler orbits, ellipses, electric fields and potentials, Gauss's Law, current resistance, capacitance, inductance, magnetic fields, Faraday's law, AC and DC circuits, and special relativity.

Math:

Basic calculus, Taylor polynomials, series, linear algebra (systems of equations, vectors and matrices, determinants, vector spaces, transformations, eigenvalues), vector calculus (multiple integrals, line and path integrals, theorems of Green and Stokes), and differential equations.

*Not all of these topics will be on your transfer exams. Please use them as a reference to study.

Sample Math & Physics Textbooks:

Ma 001A. Calculus of One and Several Variables and Linear Algebra.
Required textbooks:

- Apostol, Tom; Calculus, Vol. 1. ISBN: 0471000051

Ma 001B (Analytical). Calculus of One and Several Variables and Linear Algebra.
Required textbooks:

- Apostol, Tom; Calculus, Vol. 2. ISBN: 0471000078

Ma 001b (Practical). Calculus of One and Several Variables and Linear Algebra.

- http://www.math.brown.edu/~treil/papers/LADW/LADW.pdf

Ma 001C (Analytical). Calculus of One and Several Variables and Linear Algebra.
Required textbooks:

- Apostol, Tom; Calculus, Vol. 2. ISBN: 0471000078

Ma 001C (Practical). Calculus of One and Several Variables and Linear Algebra.
Required textbooks:

- Marsden, Jerrold, Tromba, Anthony; Vector Calculus (Sixth), W. H. Freeman, 2012. ISBN: 1429215089

Ma 002A (Analytical). Differential Equations, Probability, and Statistics.
Required textbooks:

- Robinson, James; An Introduction to Ordinary Differential Equations. ISBN: 0521533910

Ma 002A (Practical). Differential Equations, Probability, and Statistics.
Required textbooks:

- Boyce, DiPrima; Elementary differential equations and boundary value problems (9), Wiley, 2009. ISBN:0470383348

Ma 002B. Differential Equations, Probability and Statistics.
Required textbooks:

- Richard J. Larsen, Morris L. Marx; Introduction to Mathematical Statistics and Its Applications. ISBN:0321693949

- Pitman, Jim; Probability. ISBN: 0387979743

Ph 001A. Classical Mechanics and Electromagnetism.
Required textbooks:
- Steven C. Frautschi et al; The Mechanical Universe: Mechanics and Heat, Advanced Edition (1st paperback), Cambridge UP, 2007. ISBN: 0521715903

Ph 001B (Analytical). Classical Mechanics and Electromagnetism.
Required textbooks:
- T.M. Helliwell; Special Relativity (1st), University Science Books, 2009. ISBN: 978-1-891389-61-0

Ph 001B (Practical). Classical Mechanics and Electromagnetism.
Required textbooks:
- Serway, Raymond, Jewett, John; Physics for Scientists and Engineers with Modern Physics (eighth), Brooks/Cole/Cengage, 2010. ISBN: 978-1-4390-4839-9

Ph 001C (Analytic). Classical Mechanics and Electromagnetism.
Required textbooks:
- Purcell, Edward; Electricity and Magnetism, Berkeley Physics Course Vol. 2 (2nd edition). ISBN: 0070049084

Ph 001C (Practical). Classical Mechanics and Electromagnetism.
Required textbooks:
- Serway, Raymond,Jewett, John; Physics for Scientists and Engineers with Modern Physics (eighth),
- Brooks/Cole/Cengage, 2010. ISBN: 978-1-4390-4839-9

Ph 002A. Waves, Quantum Mechanics, and Statistical Physics.
Required textbooks:
- P. French; Vibration and Waves (1st), W. W. Norton Co., 1971. ISBN: 0393099369
- C. Phillips; Introduction to Quantum Mechanics (Manchester Physics Series), Wiley, 2003. ISBN:0470853247

Ph 002B. Waves, Quantum Mechanics, and Statistical Physics.
Required textbooks:
- Charles Kittel; Thermal Physics (2nd), W. H. Freeman, 1980. ISBN: 0716710889

Ph 012A. Waves, Quantum Physics, and Statistical Mechanics.
Recommended textbooks:
- P. French; Vibration and Waves (1st), W. W. Norton Co., 1971. ISBN: 0393099369
- http://www.people.fas.harvard.edu/~hgeorgi/new.htm

Ph 012B. Waves, Quantum Physics, and Statistical Mechanics.
Required textbooks:
- David J. Griffiths; Introduction to Quantum Mechanics (2nd), Prentice-Hall, 2004. ISBN: 978-0131118928

Ph 012C. Waves, Quantum Physics, and Statistical Mechanics.
Required textbooks:
- Charles Kittel; Thermal Physics (2nd), W. H. Freeman, 1980. ISBN: 0716710889