



IMPORTANT

The list below is a compilation of basic knowledge in Math and Physics required for the Master's program "Integrated Climate System Sciences" at the University of Hamburg. In case you are not skilled in the listed fields of knowledge, we strongly recommend you to fill these gaps before starting the course of studies here in Hamburg. There will hardly be any time to catch up with these deficits during the semester.

Fields of knowledge for the compulsory ICSS courses

Category I: *must know*

MATHEMATICS	PHYSICS
algebra	fundamentals of mechanics
geometry	wave kinematics (dispersion, reflection, refraction)
differential and integral calculus (limits, functions, derivatives, integrals)	basic thermodynamics
vector, tensor and multivariable calculus	
probability and applied statistics (mean, median, bias, correlation)	
infinite series (Fourier series, Taylor series)	
matrices and vectors	

Category II: *should know*

MATHEMATICS	PHYSICS
discrete mathematics (numerics)	physical properties of water, ice and air
dynamical systems	general circulation of atmosphere and ocean
elements of time series analysis	electromagnetic radiation
	basic hydrodynamics (conservation laws, main balances, vorticity)

Category III: *nice to know*

MATHEMATICS	PHYSICS
partial differential equations	boundary layer theory
	quasigeostrophic theory (barotropic and baroclinic instability)
	atmospheric thermodynamics
	radiation in the atmosphere
	cloud and precipitation physics
	atmospheric and oceanic optics