MSc in Environmental and Geomatics Engineering_GlobalE3

We can offer the following courses whose prerequisites are written below.

Cod	Area	Title	Sem	Credits
093248	ING-INF/04	NATURAL RESOURCES MANAGEMENT	2	10.0
089092	ICAR/06	GEOGRAPHIC INFORMATION SYSTEMS (GIS)	2	10.0
089104	ICAR/01 ICAR/02	HYDRAULIC ENGINEERING AND RIVER BASIN RECLAMATION AND MANAGEMENT	2	12.0

Applied Mathematics
VECTORS AND MATRICES: Operations with vectors and matrices, determinant of a matrix, inverse of a matrix, linear independence, coordinates, rank of a matrix, homogeneous linear systems, Rouchè's theorem, Cramer's theorem and Cramer's rule, Gauss-Jordan elimination. FUNCTIONS OF ONE REAL VARIABLE: Definition, limit of a function, continuous functions, derivative of a function, mean value theorem, curve sketching, integral of a continuous function, the fundamental theorem of calculus, computation of integrals. FUNCTIONS OF SEVERAL VARIABLES: Definition, continuous functions, partial derivatives, the linear approximation of a function, differentiable functions, second derivatives and Schwarz's theorem, the Hessian matrix and its applications, integral of a function of two variables, iterated integrals, change of variables, integrals in polar coordinates.

Modelling/systems analysis
Physical and mathematical models, model characteristics. Model building from physical laws and from data. Simulation, forecasting, planning and management models. Dynamical systems: concepts of equilibrium and stability and their evaluation for linear and non linear models. Pulse and frequency response, autoregressive and moving average (ARMA) models. Simulation methods and tools: software for model development and survey of available packages for the simulation of environmental systems. Parameter calibration. Optimisation of equilibrium and transient conditions, with fixed controller structure. Linear programming. Network optimisation. Development of management policies.

Physics
Fundamentals of Mechanics. Measurements. Dimensional analysis. SI units. Vectors. Frames of reference. Position, trajectory, velocity, acceleration. Kinematics of rotations. Relative kinematics. Newton's laws of dynamics; inertial mass; force. Momentum, angular momentum, kinetic and potential energy. Conservation laws. Elastic force; harmonic oscillator. Systems of particles. Collisions. Natural interactions. Experimental bases of Newton's law of gravity; gravitational mass; gravitational field. Measurement of the gravity constant.
Thermodynamics - Fundamentals. Nature of thermodynamics. Systems, states and properties. Processes and interactions between systems. First Law. Internal energy. Energy balance. Types of states. Second Law. Adiabatic availability. Available energy. Entropy. Highest-entropy principle. Entropy balance. Lowest-energy principle. Entropy fundamental relation and its characteristics. Properties of ideal and real gases. Properties of ideal gas mixtures. Engineering thermodynamics. Bulk flow; control volume; mass, energy and entropy balances. Heat transfer. Fourier's Law. Convection and radiation.

Computer science
Computers architecture, algorithms and programming languages, binary coding of information, boolean algebra. Programming in C: variables, basic types and operators, control flow instructions. Array, structures, and pointers. Functions and procedures: mechanisms for passing parameters, recursion. Dynamic data structures: stacks, queues, lists. Functions to operate with files. Data Base Management Systems, introductory concepts: logical design, conceptual design. An introduction to computer networks and internet protocols.