Description for some courses I have taken
Apivich H.

At my home university, the titles of some taught courses do not exactly match their official titles. The course title and description in the official syllabus cannot be easily changed, and the professor will instead adjust the unofficial (actual) course content according to what they believe is the most useful for students. Below are the list of computer science, mathematics and physics courses that are listed in my transcript (in order of the official course code) and the content that was taught in the class.

Official Class Name (as in my transcript)	**Unofficial Title**	**Course Content**
ICCS 202 Intermediate Computer Programming	Introduction to Programming II	• Principles of object-oriented design and problem solving; objects and classes; encapsulation, abstraction, and information hiding; inheritance and polymorphism; unit testing; elements of Java programming; the use of an integrated development environment.
ICCS 207 Introduction to File Processing	Introduction to Computer Systems	• Working in Linux environment; C programming; data representation; memory organisation and management.
ICCS 313 Introduction to Algorithms	Introduction to Algorithms	• Asymptotic algorithm analysis; algorithm selection strategies; algorithms of well-defined problems in computer science; recognizing strength and weakness of algorithms; distributed algorithms; introduction to P and NP classes of problems. • Book: Introduction to Algorithms (CLRS).

Official Class Name (as in my transcript)	Unofficial Title	Course Content
ICCS 330 Object-Oriented Design and Methodology	Interaction Designs	• Requirement analyses, including non-functional and functional requirements; data gathering; software design and prototyping; principles of good design; the software life cycle; software-development methodologies; quality assurance; cost modelling in software projects.
ICCS 481 Special Topics in Computer Science II	Contemporary Algorithms	• Suffix trees; max-flow/min-cut; balanced trees; dimensionality reduction; I/O efficient algorithms; convex optimisation; LPs; hashing; nearest neighbours; parallel algorithms. • Course website: https://cs.muic.mahidol.ac.th/courses/calgo/
ICCS 482 Professional Practices on Database Management	Introduction to Deep Learning	• Image classification; HMM; reinforcement learning; generative learning; semi-supervised learning; active learning; computational learning theory.
ICMA 214 Ordinary Differential Equations	Ordinary Differential Equations	• Introduction to ordinary differential equations; linear first order equations; non- linear first order equations; applications of first order equations; second order linear equations; applications of second order linear equation; higher order linear equations.
ICMA 219 Calculus of Several Variables	Applied Mathematical Analysis	• Vector analysis: algebra and geometry of vectors, vector differential and integral calculus, theorems of Green, Gauss, and Stokes; complex analysis: analytic functions, complex integrals and residues, Taylor and Laurent series. • I took this class during my exchange semester (Fall 2018) at University of Wisconsin-Madison. The corresponding course code is MATH 321.

Official Class Name (as in my transcript)	Unofficial Title	Course Content
ICMA 242 Discrete Mathematics	Discrete Mathematics	• Mathematical statements and logical deduction; proves and proof techniques including direct, contradiction, contrapositive, induction, and invariants; summation, asymptotics, and recurrences; counting: combinations, permutations, and basic counting techniques; discrete probability: finite probability space, events, conditional probability, independence, random variables, expectation, variance, covariance, discrete distributions; graphs: tree, tree traversal, undirected graphs, directed graphs, weighted graphs, Euler's tours, isomorphisms, spanning trees.
ICMA 321 Linear Algebra	Linear Algebra	• Linear equations; system of linear equations; matrices; Euclidean spaces; traces and determinants; general vector spaces; linear transformations; eigenvalues and eigenvectors; inner product spaces.
ICMA 322 Advanced Calculus	Introduction to Real Analysis	• Real and complex number systems; functions; continuity; convergence; differentiation; integration. • Book: Understanding Analysis (2nd Ed.) by Stephen Abbott.
ICMA 323 Partial Differential Equations	Partial Differential Equations	• Heat equation; method of separation of variables; Fourier series; wave equation; Laplace’s equation.
ICMA 346 Optimisation	Introduction to Optimisation	• Linear programming; duality; network flow problems; convex programming; non convex and combinatorial models • I took this class during my exchange semester (Fall 2018) at University of Wisconsin-Madison. This is a website (taught by a different professor) with the class contents: https://laurentlessard.com/teaching/524-intro-to-optimization/.

Official Class Name (as in my transcript)	Unofficial Title	Course Content
ICPY 221 Computer Programming for Physics	Introduction to Programming I	• Fundamental principles of computer programs; basic programming constructs (condition, iteration, functions); problem formulation; and introduction to object-oriented programming. • The course is shared with Computer Science majors. • Course taught in Python.
ICPY 321 Intermediate Mechanics	Classical Mechanics I	• Vector and Vector Calculus; Newton's Law; Oscillation; Work, Force and Potential; Motion of particles; System of Particles; Rigid Body; Rotation and rotational inertia; Planetary Motion; Coupled Oscillation. • Book: (earlier sections of) Classical Mechanics by Taylor
ICPY 322 Electricity and Magnetism	Electricity and Magnetism I	• The Coulomb force; electric fields and potential; Gauss' law; dielectrics; the Biot-Savart law; Ampere's law; magnetic field and magnetic induction; vector and scalar potential; Faraday's law. • Class textbook is E&M by Griffiths (relevant sections).
ICPY 323 Electrodynamics	Electricity and Magnetism II	• Wave equations; radiation fields; guided waves; cavity resonators; radiation from an oscillating dipole and a group of moving charges. • Class textbook is E&M by Griffiths (relevant sections).
ICPY 334 Numerical Methods For Physics	Numerical Methods	• Taylor series; root finding; differentiation and integration; systems of linear equations; gradient descent; differential equations; Monte Carlo method. • The course is shared with Computer Science majors.

Official Class Name (as in my transcript)	Unofficial Title	Course Content
ICPY 361 Quantum Mechanics I	Quantum Mechanics I	• Quantum theory and wave-particle duality; probability in quantum theory; the Schrodinger equation in one dimension; operator methods and matrix representation. • Class textbook is Introduction to QM by Griffiths.
ICPY 451 Analytical Mechanics	Classical Mechanics II	• Non-inertial reference systems; rigid bodies in three dimension; principle of least action; Lagrangian Mechanics and Hamiltonian Mechanics.
ICPY 452 Statistical Mechanics	Statistical Mechanics	• Statistical physics; distributions; Boltzmann‘s factor; partition and grand partition functions; Ising’s model; quantum statistics. • Class textbook is An Introduction to Thermal Physics by Daniel Schroeder.
ICPY 461 Quantum Mechanics II	Quantum Mechanics II	• Schrodinger’s equation in three dimensions; Hydrogen atom; Angular momentum; Discussion of some approximation methods such as the variational method and perturbation theory; Application of quantum mechanics various kinds of physical problems including elementary quantum computation and algorithm.

Official Class Name (as in my transcript)	Unofficial Title	Course Content
ICPY 471 Atomic and Molecular Physics	Atomic Physics	• Nuclear atom; hydrogen atom; Bohr-Sommerfeld model, wave model, electron spin, description of quantum electron spin, description of quantum electrodynamic effects; external fields; many-electron atoms; central field, Pauli principle, multiplets, periodic table, x-ray spectra, vector coupling, systematics of ground states; nuclear effects in atomic spectra. • I took this class during my exchange semester (Fall 2018) at University of Wisconsin-Madison. The class website is located here: http://hexagon.physics.wisc.edu/teaching%20public/2018f%20ph545%20atomic%20structure/ph545home.htm
ICPY 472 Solid State Physics	Solid State Physics	• Periodic structure and symmetries of crystals, diffraction, reciprocal lattice, chemical bonding, lattice dynamics, phonons, thermal properties, free electron gas, band theory, applications in metals and semi conduction materials. • Class textbook is Solid State Physics by Philip Hofmann.

Some minor notes:

- My transcript (at my undergraduate university and for my exchange semester) is available upon request. I won't be posting these documents online.
- Course catalog from my undergraduate is linked here: https://muic.mahidol.ac.th/eng/wp-content/downloads/catalog/muic_catalog_2016.pdf