COURSE SPECIFICATION FORM

for new course proposals and course amendments

Department/School:	**Mathematics**	**Academic Session:**	**2017-18**
Course Title:	Principles of Algorithm Design	**Course Value:** (UG courses = unit value, PG courses = notional learning hours)	0.5 unit
Course Code:	MT3140	**Course JACS Code:** (Please contact Data Management for advice)	G100
Availability: (Please state which teaching terms)	Term 1	**Status:**	Optional Condonable
Pre-requisites:	MT2630	**Co-requisites:**	-
Co-ordinator:	-		
Course Staff:	-		
Aims:	The development of efficient algorithms is essential when considering problems with large inputs. Usually an algorithm has certain specifications, for example that it should solve a problem and take at most f(n) steps on any input of size n. This course is about the design of efficient algorithms and proving that they meet the desired specification. The course introduces basic principles and methods of algorithm design and analysis and considers fundamental problems like sorting numbers and multiplying matrices. Key aims of the course include: _ to provide an introduction to the theory of algorithms; _ to develop the skill of designing algorithms.		
Learning Outcomes:	1. understand and apply the fundamental principles of algorithm design; 2. analyse basic algorithms; know amortized, average-case and worst-case analysis; 3. know basic data-structures 4. know efficient algorithms for sorting numbers; know lower bounds on comparison based algorithms for sorting numbers; 5. know asymptotic notation.		
Course Content:	Basic algorithmic principles: Greedy algorithms, divide-and-conquer, dynamic programming, randomized algorithms. Analysis of algorithms: Recurrences, O-notation, worst-case analysis, amortized analysis, probabilistic analysis; lower bounds for comparison-based sorting and finding the median. Basic data structures: arrays, stacks, balanced search trees, hashing.		
Teaching & Learning Methods:	The total number of notional learning hours associated with this course are 150. 3 hours of lectures a week over 11 weeks. 33 hours total. 117 hours of private study, including work on problem sheets and examination preparation. This may include discussions with the course leader if the student wishes.		
Key Bibliography:	Introduction to Algorithms by Cormen, Leiserson, Rivest, and Stein Probability and Computing: Randomized Algorithms and Probabilistic Analysis by Mitzenmacher and Upfal.		
Formative Assessment & Feedback:	Formative assignments in the form of 8 problem sheets. The students will receive feedback as written comments on their attempts.		
Summative Assessment:	**Exam:** 100% Written exam. A two hour paper. **Coursework:** None		

Updated September 2017

The information contained in this course outline is correct at the time of publication, but may be subject to change as part of the Department's policy of continuous improvement and development. Every effort will be made to notify you of any such changes.