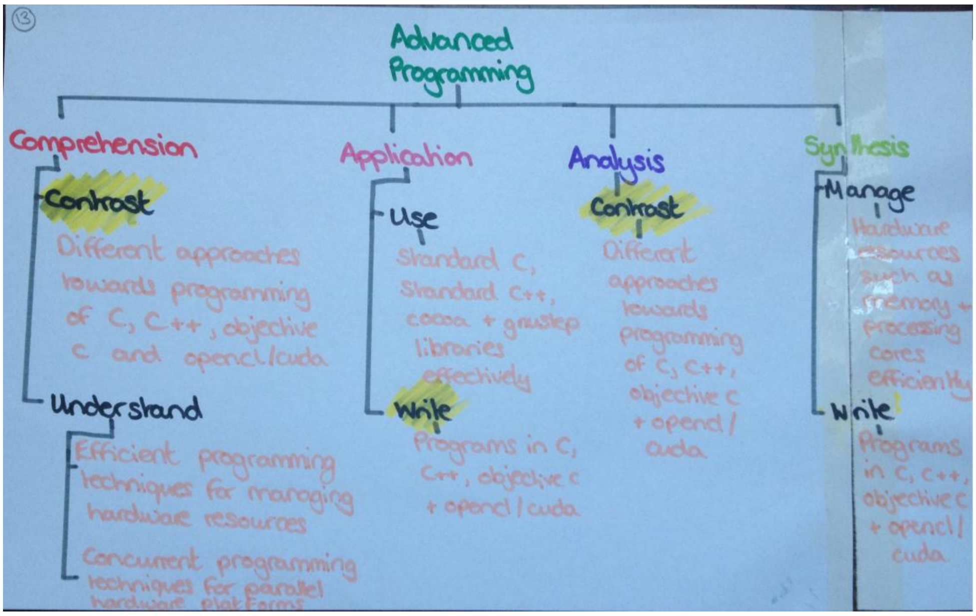
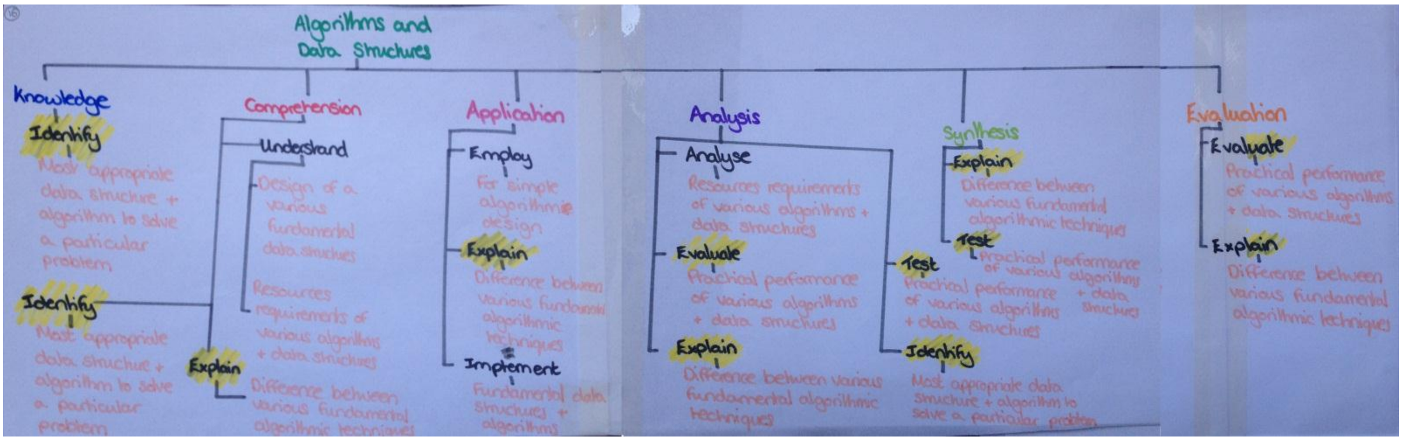
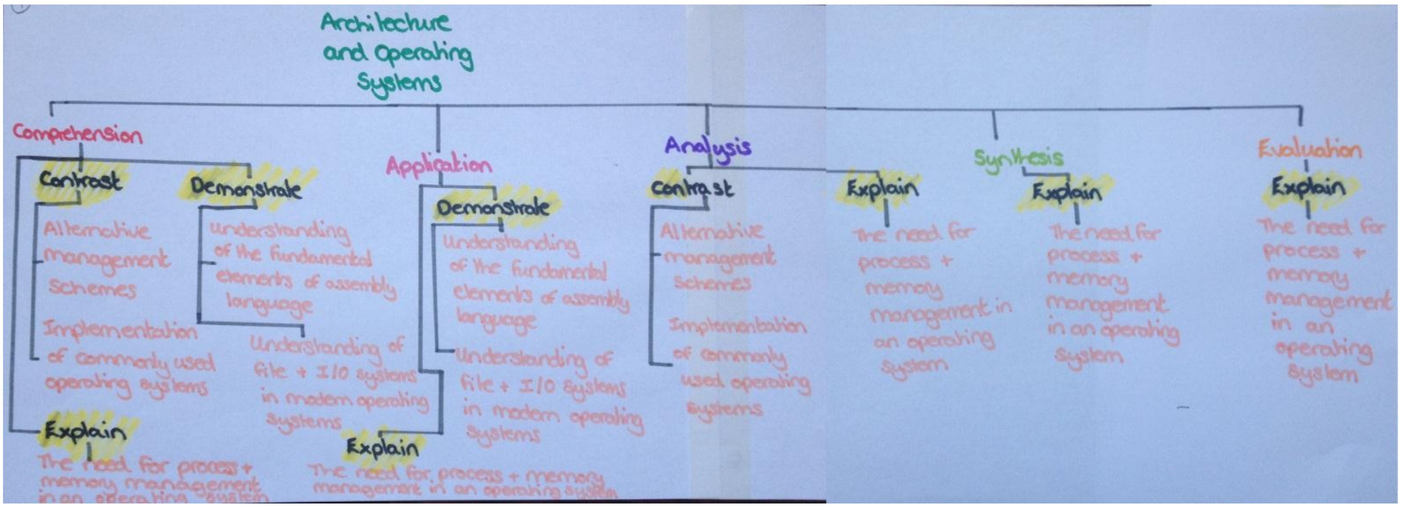
Advanced Programming


13
Advanced Programming
Comprehension
Contrast
Different approaches towards programming of C, C++, objective C and opencl/cuda
Understand
Efficient programming techniques for managing hardware resources
Concurrent programming techniques for parallel hardware platforms
Application
Use
Standard C, Standard C++, cocoa + gnustep libraries effectively
Write
Programs in C, C++, objective c + opencl/cuda
Analysis
Contrast
Different approaches towards programming of C, C++, objective C + opencl/cuda
Synthesis
Manage
Hardware resources such as memory + processing cores efficiently
Write
Programs in C, C++, objective C + opencl/cuda

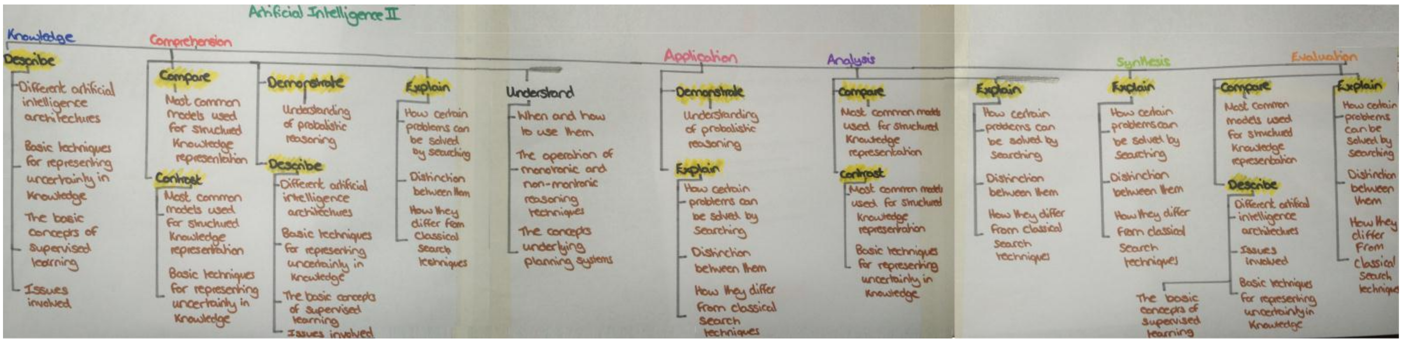
Algorithms and Data Structures


Algorithms and Data Structures
Knowledge
Identify
Most appropriate data structure + algorithm to solve a particular problem
Identify
Most appropriate data structure + algorithm to solve a particular problem
Comprehension
Understand
Design of a various fundamental data structures
Resources requirements of various algorithms + data structures
Explain
Difference between various fundamental algorithmic techniques
Application
Employ
For simple algorithmic design
Explain
Difference between various fundamental algorithmic techniques
Implement
Fundamental data structures + algorithms
Analysis
Analyse
Resources requirements of various algorithms + data structures
Evaluate
Practical performance of various algorithms + data structures
Explain
Difference between various fundamental algorithmic techniques
Synthesis
Explain
Difference between various fundamental algorithmic techniques
Test
Practical performance of various algorithms + data structures
Test
Practical performance of various algorithms + data structures
Identify
Most appropriate data structure + algorithm to solve a particular problem
Evaluation
Evaluate
Practical performance of various algorithms + data structures
Explain
Difference between various fundamental algorithmic techniques

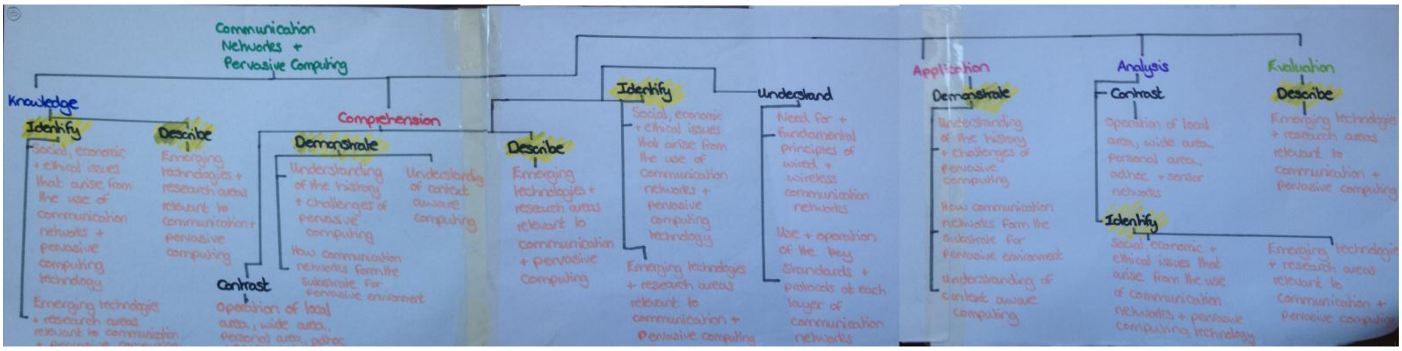
Architecture and Operating Systems


Architecture and Operating Systems
Comprehension
Contrast
Alternative management schemes
Implementation of commonly used operating systems
Explain
The need for process + memory management in an operating system
Demonstrate
Understanding of the fundamental elements of assembly language
Understanding of file + I/O systems in modern operating systems
Application
Demonstrate
Understanding of the fundamental elements of assembly language
Understanding of file + I/O systems in modern operating systems
Explain
The need for process + memory management in an operating system
Analysis
Contrast
Alternative management schemes
Implementation of commonly used operating systems
Explain
The need for process + memory management in an operating system
Synthesis
Explain
The need for process + memory management in an operating system
Evaluation
Explain
The need for process + memory management in an operating system

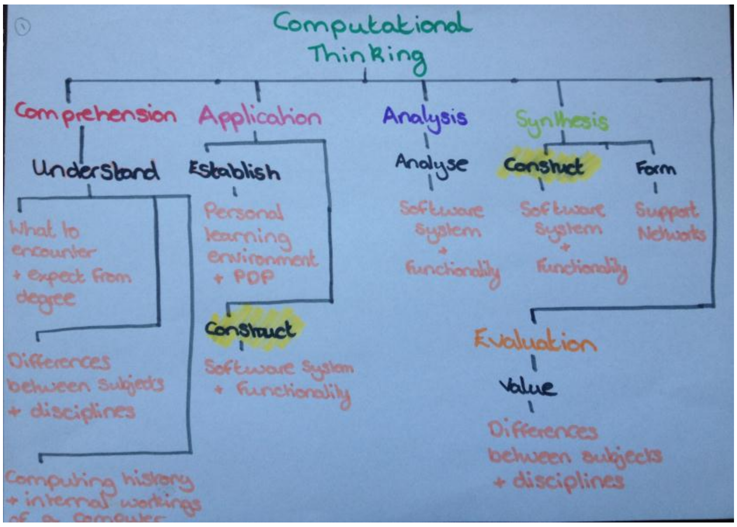
Artificial Intelligence


Artificial Intelligence II
Knowledge
Describe
Different artificial intelligence architectures
Basic techniques for representing uncertainty in knowledge
The basic concepts of supervised learning
Issues involved
Comprehension
Compare
Most common models used for structured knowledge representation
Contrast
Most common models used for structured knowledge representation
Basic techniques for representing uncertainty in knowledge
Demonstrate
Understanding of probalistic reasoning
Describe
Different artificial intelligence architectures
Basic techniques for representing uncertainty in knowledge
The basic concepts of supervised learning
Issues involved
Explain
How certain problems can be solved by searching
Distinction between them
How they differ from classical search techniques
Understand
When and how to use them
The operation of monotonic and non-montonic reasoning techniques
The concepts underlying planning systems
Application
Demonstrate
Understanding of probalistic reasoning
Explain
How certain problems can be solved by searching
Distinction between them
How they differ from classical search techniques
Analysis
Compare
Most common models used for structured knowledge representation
Contrast
Most common models used for structured knowledge representation
Basic techniques for representing uncertainty in knowledge
Explain
How certain problems can be solved by searching
Distinction between them
How they differ from classical search techniques
Synthesis
Explain
How certain problems can be solved by searching
Distinction between them
How they differ from classical search techniques
The basic concepts of supervised learning
Evaluation
Compare
Most common models used for structured knowledge representation
Describe
Different artificial intelligence architectures
Issues involved
Basic techniques for representing uncertainty in knowledge
Explain
How certain problems can be solved by searching
Distinction between them
How they differ from classical search techniques

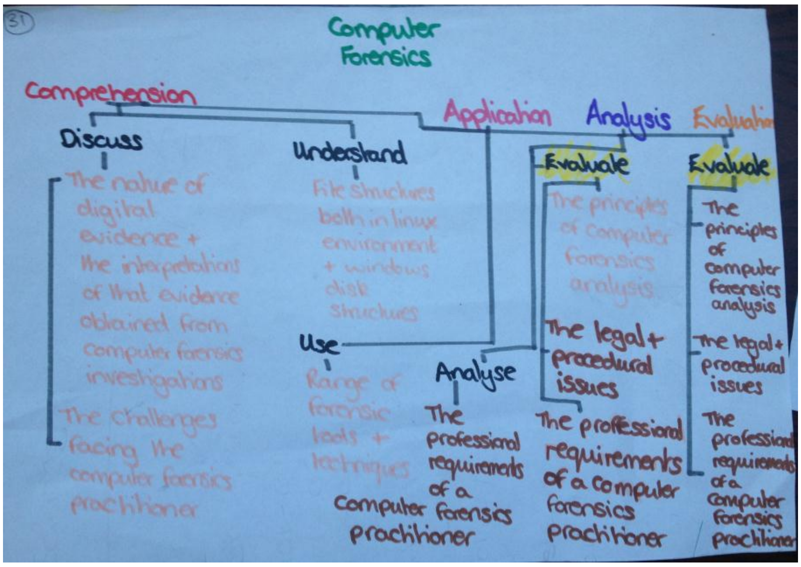
Communication Networks and Pervasive Computing


Communication Networks + Pervasive Computing
Knowledge
Identify
Social, economic + ethical issues that arise from the use of communication networks + pervasive computing technology
Emerging technologies + research areas relevant to communication + pervasive computing
Describe
Emerging technologies + research areas relevant to communication + pervasive computing
Comprehension
Demonstrate
Understanding of the history + challenges of pervasive computing
How communication networks form the substrate for pervasive environment
Understanding of context aware computing
Contrast
Operation of local area, wide area, personal area, adhoc
Describe
Emerging technologies + research areas relevant to communication + pervasive computing
Identify
Social, economic + ethical issues that arise from the use of communication networks + pervasive computing technology
Emerging technologies + research areas relevant to communication + pervasive computing
Understand
Need for + fundamental principles of wired + wireless communication networks
Use + operation of the key standards + protocols at each layer of communication networks
Application
Demonstrate
Understanding of the history + challenges of pervasive computing
How communication networks form the substrate for pervasive environment
Understanding of context aware computing
Analysis
Contrast
Operation of local area, wide area, personal area, adhoc + sensor networks
Identify
Social, economic + ethical issues that arise from the use of communication networks + pervasive computing technology
Emerging technologies + research areas relevant to communication + pervasive computing
Evaluation
Describe
Emerging technologies + research areas relevant to communication + pervasive computing

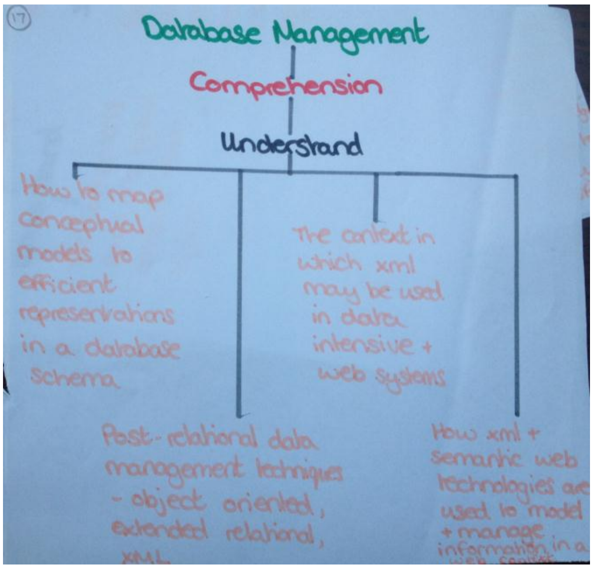
Computational Thinking


Computational Thinking
Comprehension
Understand
What to encounter + expect from degree
Differences between subjects + disciplines
Computing history + internal workings of a computer
Application
Establish
Personal learning environment + PDP
Construct
Software System + functionality
Analysis
Analyse
Software system + functionality
Synthesis
Construct
Software system + functionality
Form
Support Networks
Evaluation
Value
Differences between subjects + disciplines

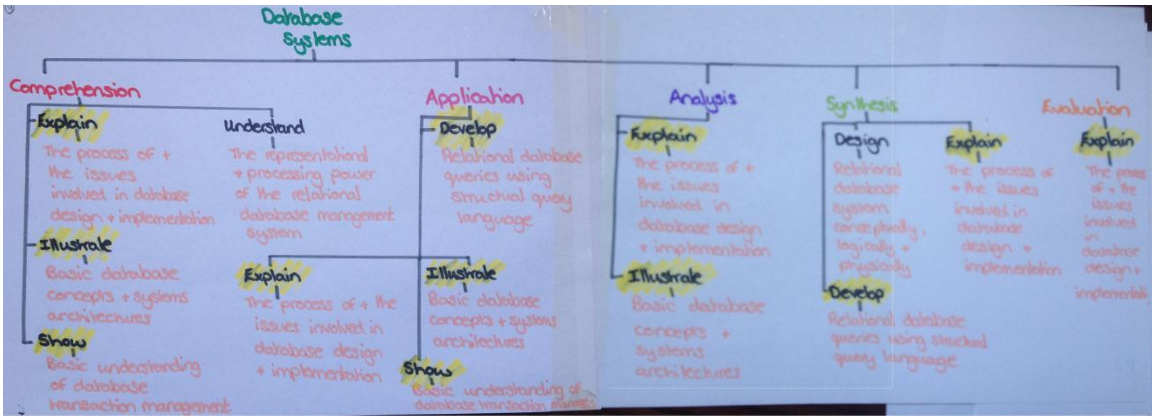
Computer Forensics


31
Computer Forensics
Comprehension
Discuss
The nature of digital evidence + the interpretations of that evidence obtained from computer forensics investigations
The challenges facing the computer forensics practitioner
Understand
File structures both in linux environment + windows disk structures
Use
Range of forensic tools + techniques
Application
Analyse
The professional requirements of a computer forensics practitioner
Analysis
Evaluate
The principles of computer forensics analysis
The legal + procedural issues
The professional requirements of a computer forensics practitioner
Evaluation
Evaluate
The principles of computer forensics analysis
The legal + procedural issues
The professional requirements of a computer forensics practitioner

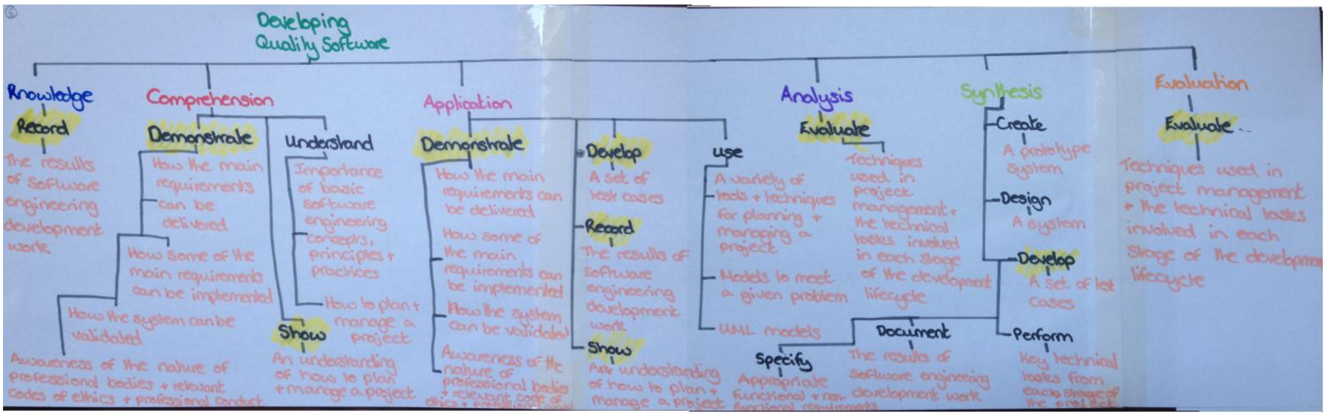
Database Management


17
Database Management
Comprehension
Understand
How to map conceptual models to efficient representations in a database schema
The context in which xml may be used in data intensive + web systems
Post-relational data management techniques - object oriented, extended relational, XML
How xml + semantic web technologies are used to model + manage information in a

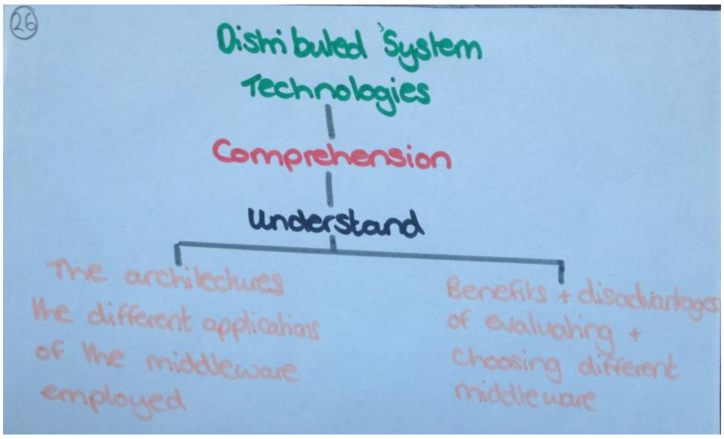
Database Systems


Database Systems
Comprehension
Explain
The process of + the issues involved in database design + implementation
Illustrate
Basic database concepts + systems architectures
Show
Basic understanding of database transaction management
Understand
The representational + processing power of the relational database management system
Explain
The process of + the issues involved in database design + implementation
Application
Develop
Relational database queries using structual query language
Illustrate
Basic database concepts + systems architectures
Show
Basic understanding of database transaction manage
Analysis
Explain
The process of + the issues involved in database design + implementation
Illustrate
Basic database concepts + systems architectures
Synthesis
Design
Relational database system conceptually, logically + physically
Develop
Relational database queries using structual query language
Explain
The process of + the issues involved in database design + implementation
Evaluation
Explain
The process of + the issues involved in database design + implementati

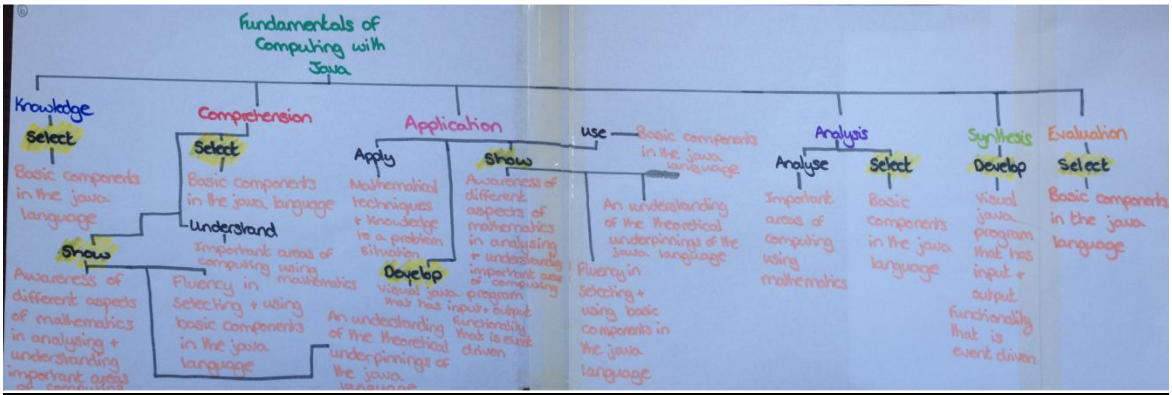
Developing Quality Software


Developing Quality Software
Knowledge
Record
The results of Software engineering development work
Comprehension
Demonstrate
How the main requirements can be delivered
How some of the main requirements can be implemented
How the system can be validated
Awareness of the nature of professional bodies + relevant codes of ethics + professional conduct
Understand
Importance of basic software engineering concepts, principles + practices
How to plan + manage a project
Show
An understanding of how to plan + manage a project
Application
Demonstrate
How the main requirements can be delivered
How some of the main requirements can be implemented
How the system can be validated
Awareness of the nature of professional bodies + relevant code of ethics + professional conduct
Develop
A set of test cases
Record
The results of Software engineering development work
Show
An understanding of how to plan + manage a project
use
A variety of tools + techniques for planning + managing a project
Models to meet a given problem
UML models
Specify
Appropriate functional + non-functional requirements
Analysis
Evaluate
Techniques used in project management + the technical tasks involved in each stage of the development lifecycle
Document
The results of software engineering development work
Synthesis
Create
A prototype system
Design
A system
Develop
A set of test cases
Perform
Key technical tasks from each stage of the project
Evaluation
Evaluate
Techniques used in project management + the technical tasks involved in each stage of the developme lifecycle

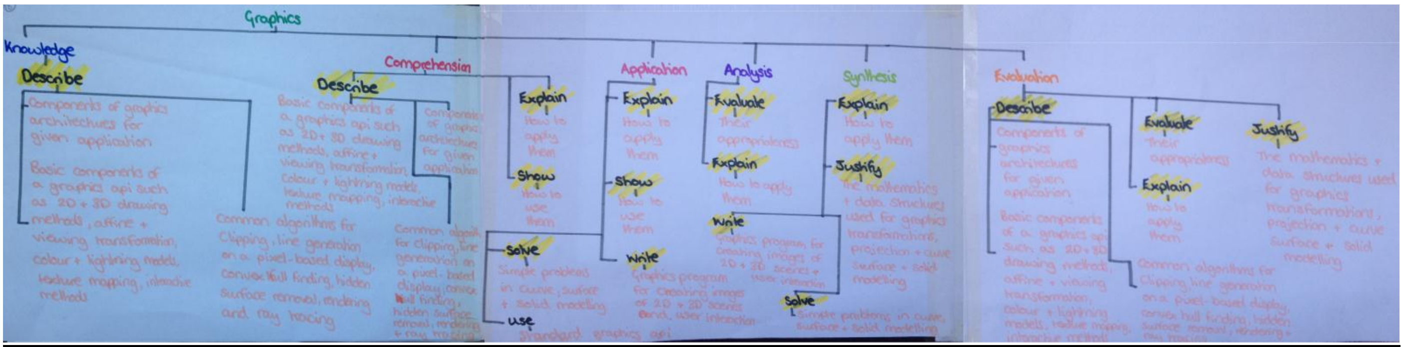
Distributed System Technologies


26
Distributed System Technologies
Comprehension
Understand
The architectures the different applications of the middleware employed
Benefits + disadvantages of evaluating + choosing different middleware

Fundamentals of Computing with Java


⑥
Fundamentals of Computing with Java
Knowledge
Select
Basic components in the java language
Show
Awareness of different aspects of mathematics in analysing + understanding important areas of computing
Comprehension
Select
Basic components in the java language
Understand
Important areas of computing using mathematics
Fluency in selecting + using basic components in the java language
Application
Apply
Mathematical techniques + knowledge to a problem situation
Develop
Visual java program that has input + output functionality that is event driven
An understanding of the theoretical underpinnings of the java language
Show
Awareness of different aspects of mathematics in analysing + understanding important areas of computing
use
Basic components in the java language
An understanding of the theoretical underpinnings of the java language
Fluency in selecting + using basic components in the java language
Analysis
Analyse
Important areas of computing using mathematics
Select
Basic components in the java language
Synthesis
Develop
Visual java program that has input + output functionality that is event driven
Evaluation
Select
Basic components in the java language

Graphics


Graphics
Knowledge
Describe
Components of graphics architectures for given application
Basic components of a graphics api such as 2D + 3D drawing methods, affine + viewing transformation, colour + lightning models, texture mapping, interactive methods
Comprehension
Describe
Basic components of a graphics api such as 2D + 3D drawing methods, affine + viewing transformation, colour + lightning models, texture mapping, interactive methods
Components of graphics architectures for given application
Common algorithms for clipping, line generation on a pixel-based display, convex hull finding, hidden surface removal, rendering and ray tracing
Common algorithms for clipping, line generation on a pixel-based display, convex hull finding, hidden surface removal, rendering + ray tracing
Explain
How to apply them
Show
How to use them
Solve
Simple problems in curve, surface + solid modelling
use
Standard graphics api
Application
Explain
How to apply them
Show
How to use them
Write
Graphics program for creating images of 2D + 3D scenes and user interaction
Analysis
Evaluate
Their appropriateness
Explain
How to apply them
Write
Graphics program for creating images of 2D + 3D scenes + user interaction
Synthesis
Explain
How to apply them
Justify
The mathematics + data structures used for graphics transformations, projection + curve surface + solid modelling
Solve
Simple problems in curve, surface + solid modelling
Evaluation
Describe
Components of graphics architectures for given application
Basic components of a graphics api such as 2D + 3D drawing methods, affine + viewing transformation, colour + lightning models, texture mapping, interactive methods
Common algorithms for clipping, line generation on a pixel-based display, convex hull finding, hidden surface removal, rendering + ray tracing
Evaluate
Their appropriateness
Explain
How to apply them
Justify
The mathematics + data structures used for graphics transformations, projection + curve surface + solid modelling

Human Computer Interaction

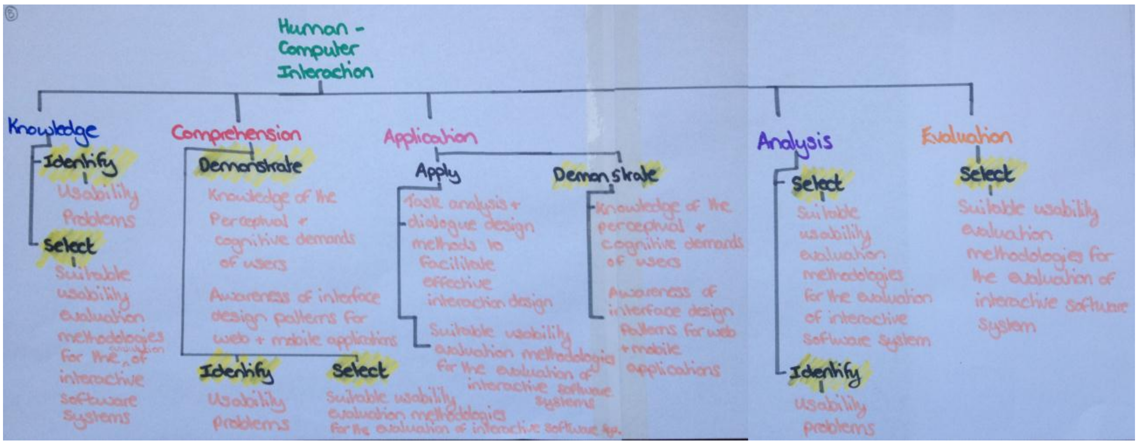
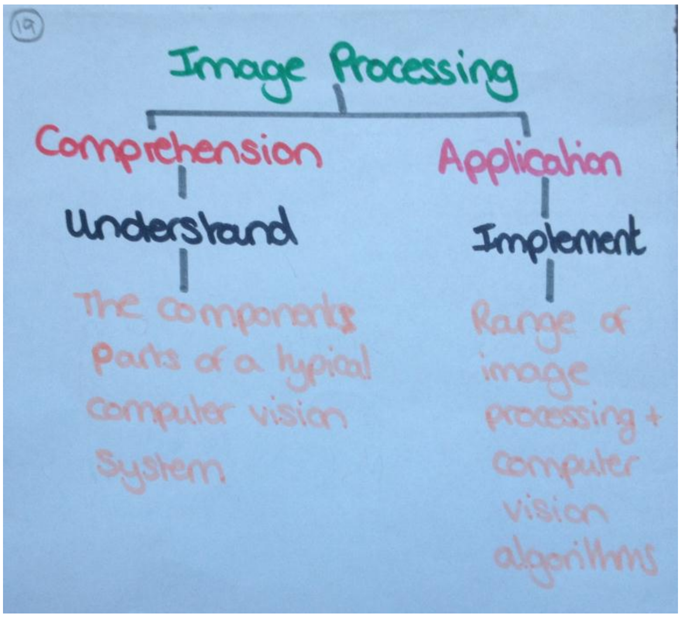
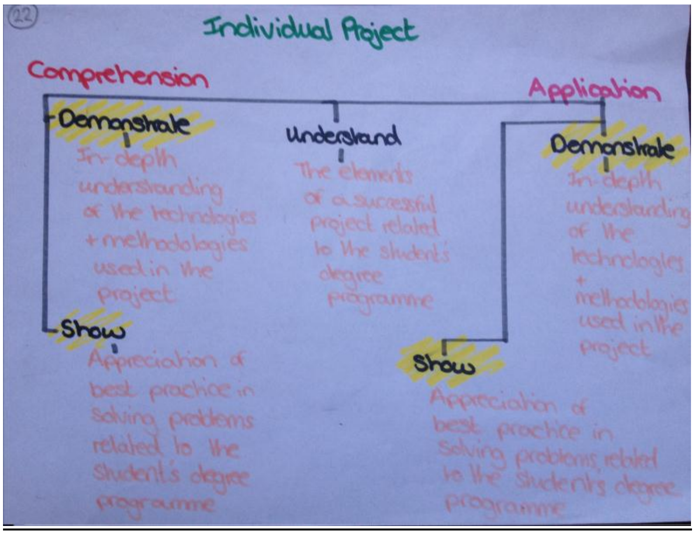

⑥
Human - Computer Interaction
Knowledge
Identify
Usability problems
Select
Suitable usability evaluation methodologies for the evaluation of interactive software systems
Comprehension
Demonstrate
Knowledge of the perceptual + cognitive demands of users
Awareness of interface design patterns for web + mobile applications
Identify
Usability problems
Select
Suitable usability evaluation methodologies for the evaluation of interactive software sys.
Application
Apply
Task analysis + dialogue design methods to facilitate effective interaction design
Suitable usability evaluation methodologies for the evaluation of interactive software systems
Demonstrate
Knowledge of the perceptual + cognitive demands of users
Awareness of interface design patterns for web + mobile applications
Analysis
Select
Suitable usability evaluation methodologies for the evaluation of interactive software system
Identify
Usability problems
Evaluation
Select
Suitable usability evaluation methodologies for the evaluation of interactive software system

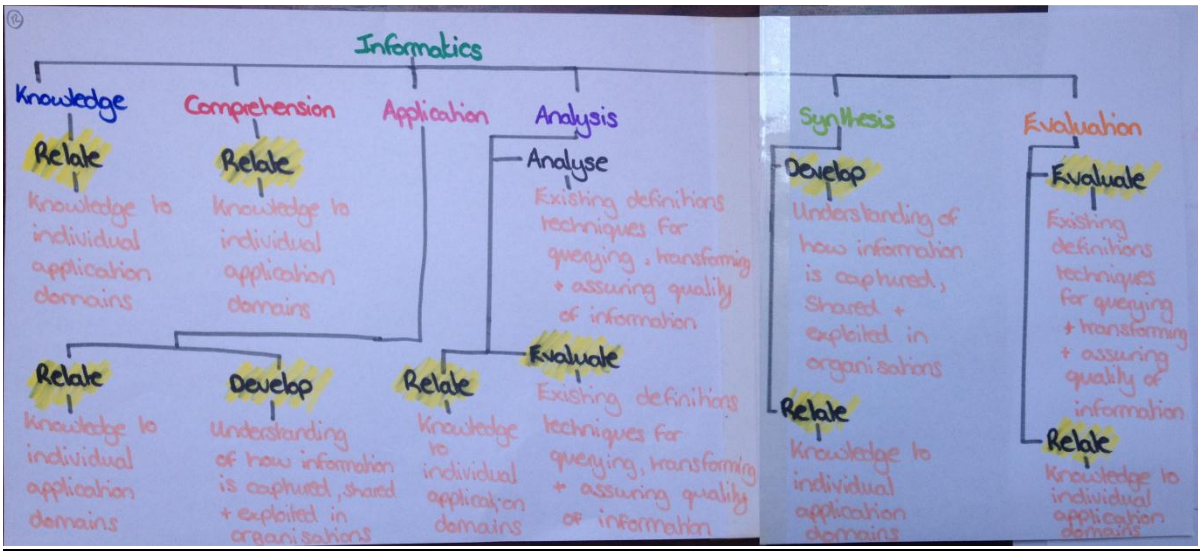
Image Processing


⑲
Image Processing
Comprehension
Understand
The components parts of a typical computer vision system
Application
Implement
Range of image processing + computer vision algorithms

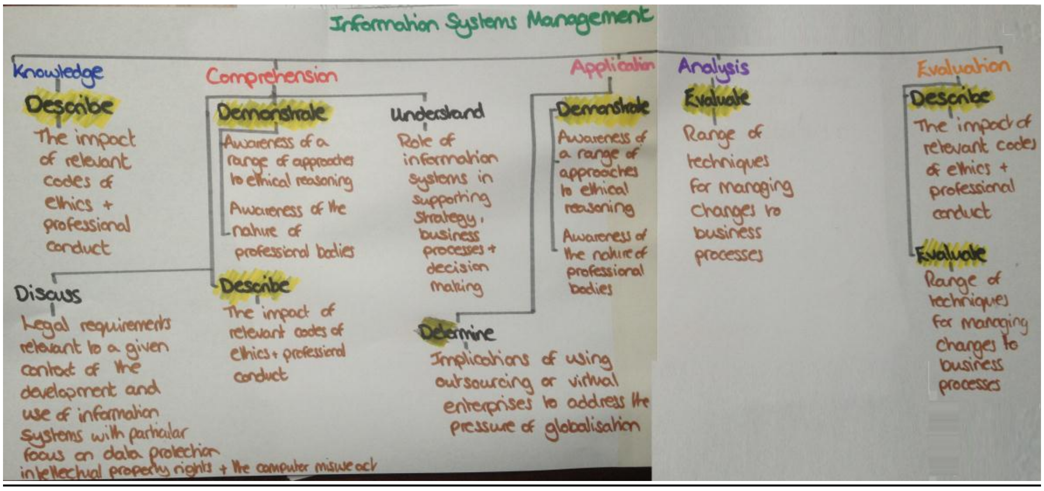
Individual Project


22
Individual Project
Comprehension
Demonstrate
In-depth understanding of the technologies + methodologies used in the project
Show
Appreciation of best practice in solving problems related to the student's degree programme
Understand
The elements of a successful project related to the student's degree programme
Application
Demonstrate
In-depth understanding of the technologies + methodologies used in the project
Show
Appreciation of best practice in solving problems related to the student's degree programme

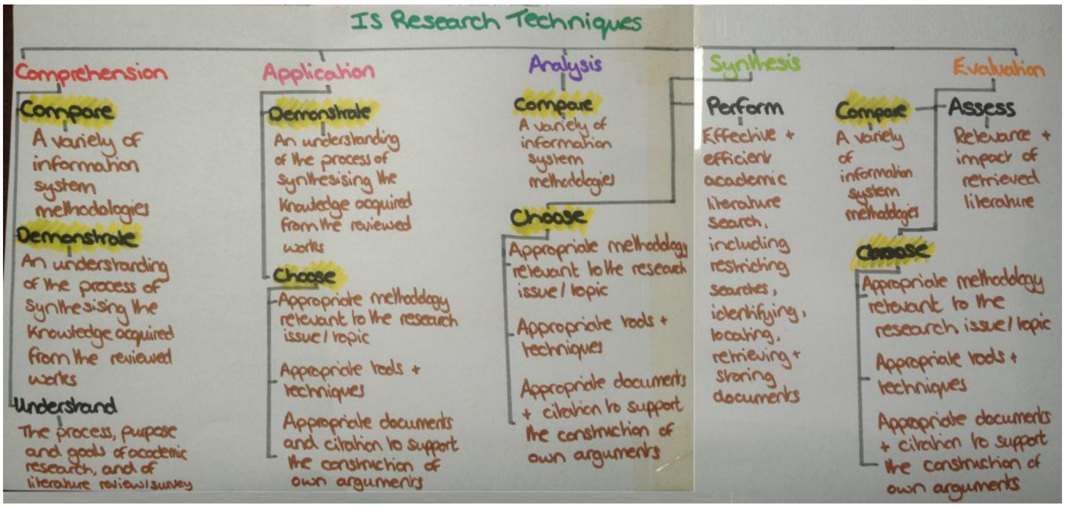
Informatics


Informatics
Knowledge
Relate
Knowledge to individual application domains
Comprehension
Relate
Knowledge to individual application domains
Application
Relate
Knowledge to individual application domains
Develop
Understanding of how information is captured, shared + exploited in organisations
Relate
Knowledge to individual application domains
Analysis
Analyse
Existing definitions techniques for querying, transforming + assuring quality of information
Evaluate
Existing definitions techniques for querying, transforming + assuring quality of information
Synthesis
Develop
Understanding of how information is captured, shared + exploited in organisations
Relate
Knowledge to individual application domains
Evaluation
Evaluate
Existing definitions techniques for querying + transforming + assuring quality of information
Relate
Knowledge to individual application domains

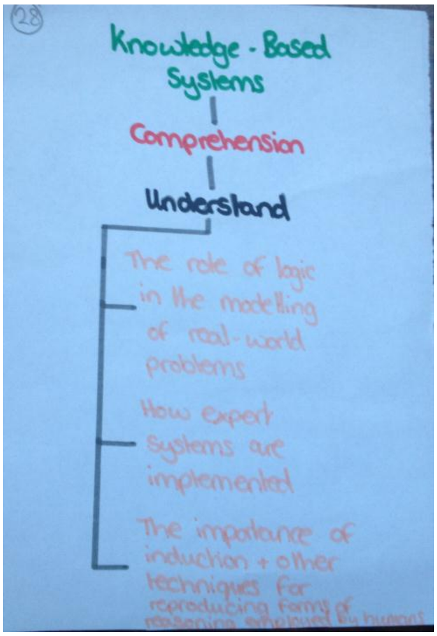
Information Systems Management


Information Systems Management
Knowledge
Describe
The impact of relevant codes of ethics + professional conduct
Discuss
Legal requirements relevant to a given context of the development and use of information systems with particular focus on data protection intellectual property rights + the computer misuse act
Comprehension
Demonstrate
Awareness of a range of approaches to ethical reasoning
Awareness of the nature of professional bodies
Describe
The impact of relevant codes of ethics + professional conduct
Understand
Role of information systems in supporting strategy, business processes + decision making
Application
Demonstrate
Awareness of a range of approaches to ethical reasoning
Awareness of the nature of professional bodies
Determine
Implications of using outsourcing or virtual enterprises to address the pressure of globalisation
Analysis
Evaluate
Range of techniques for managing changes to business processes
Evaluation
Describe
The impact of relevant codes of ethics + professional conduct
Evaluate
Range of techniques for managing changes to business processes

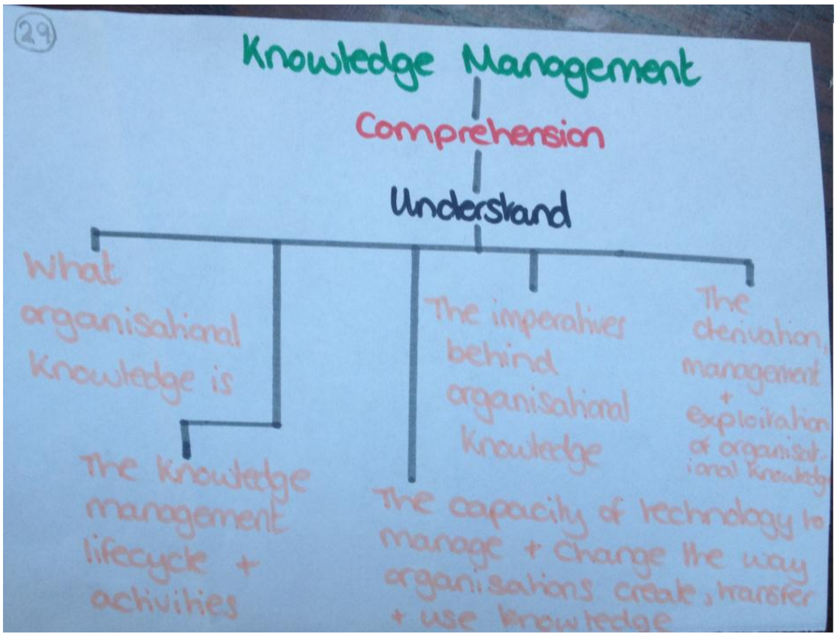
IS Research Techniques


IS Research Techniques
Comprehension
Compare
A variety of information system methodologies
Demonstrate
An understanding of the process of synthesising the knowledge acquired from the reviewed works
Understand
The process, purpose and goals of academic research, and of literature review/survey
Application
Demonstrate
An understanding of the process of synthesising the knowledge acquired from the reviewed works
Choose
Appropriate methodology relevant to the research issue / topic
Appropriate tools + techniques
Appropriate documents and citation to support the construction of own arguments
Analysis
Compare
A variety of information system methodologies
Choose
Appropriate methodology relevant to the research issue / topic
Appropriate tools + techniques
Appropriate documents + citation to support the construction of own arguments
Synthesis
Perform
Effective + efficient academic literature search, including restricting searches, identifying, locating, retrieving + storing documents
Evaluation
Compare
A variety of information system methodologies
Assess
Relevance + impact of retrieved literature
Choose
Appropriate methodology relevant to the research issue / topic
Appropriate tools + techniques
Appropriate documents + citation to support the construction of own arguments

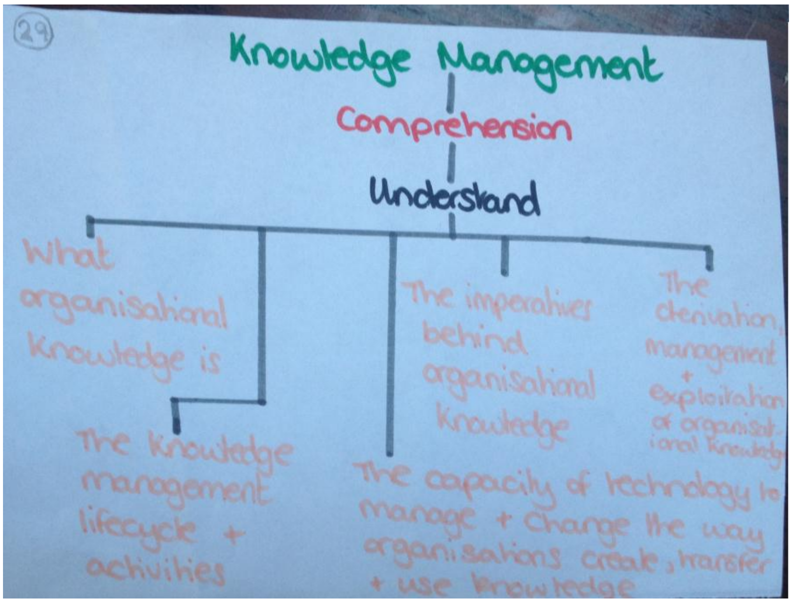
Knowledge Based Systems


28
Knowledge - Based Systems
Comprehension
Understand
The role of logic in the modelling of real-world problems
How expert systems are implemented
The importance of induction + other techniques for reproducing forms of reasoning employed by humans

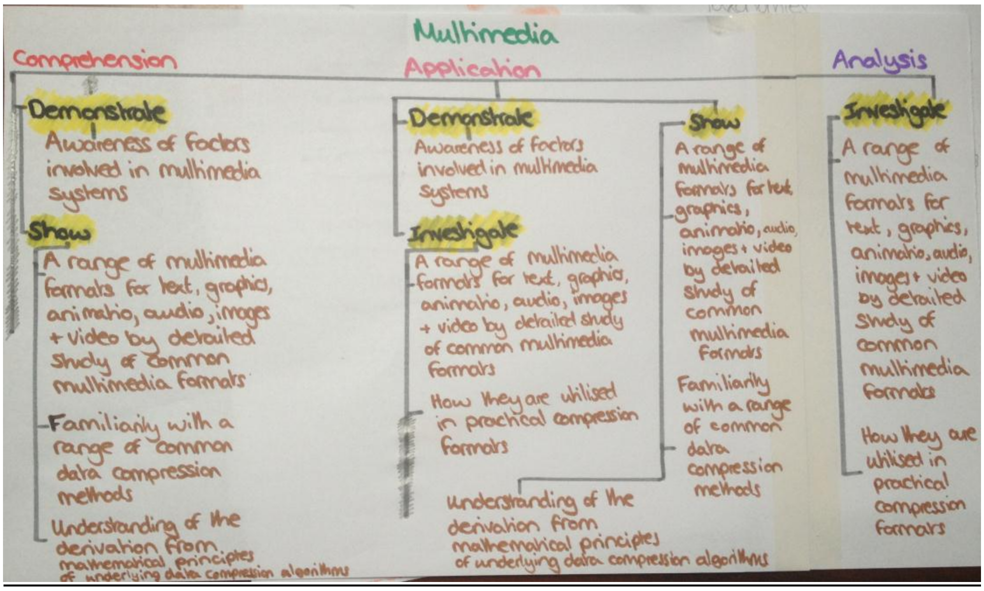
Knowledge Management


29
Knowledge Management
Comprehension
Understand
What organisational knowledge is
The knowledge management lifecycle + activities
The capacity of technology to manage + change the way organisations create, transfer + use knowledge
The imperatives behind organisational knowledge
The derivation, management + exploitation of organisational knowledge

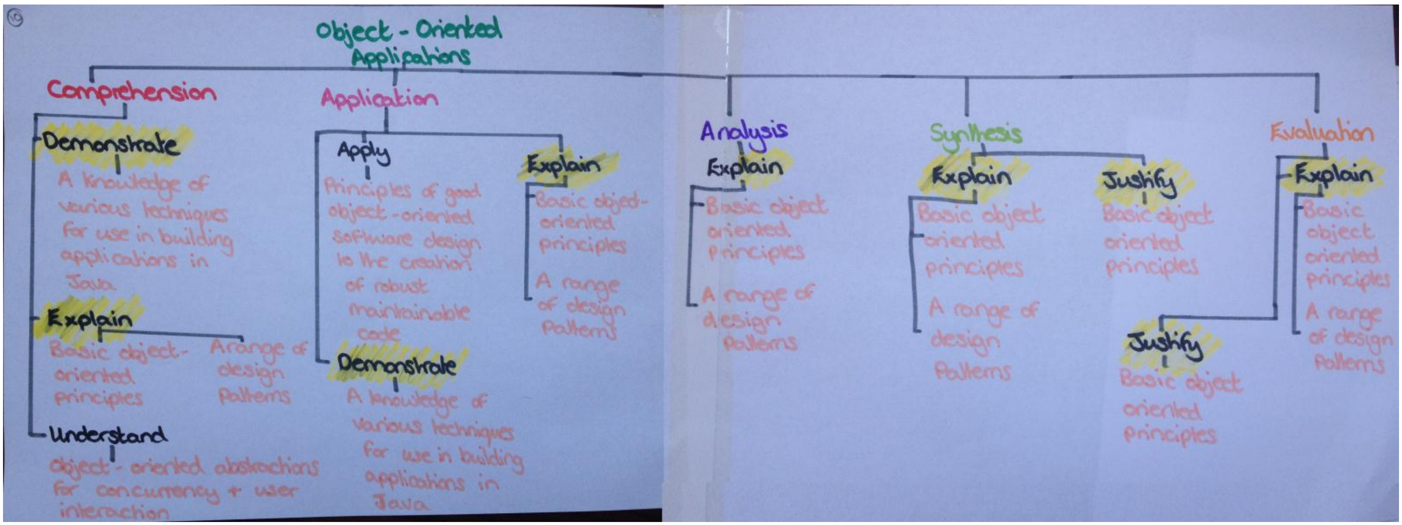
Mobile Communications and Meta Heuristics


29
Knowledge Management
Comprehension
Understand
What organisational knowledge is
The knowledge management lifecycle + activities
The imperatives behind organisational knowledge
The capacity of technology to manage + change the way organisations create, transfer + use knowledge
The derivation, management + exploitation of organisational knowledge

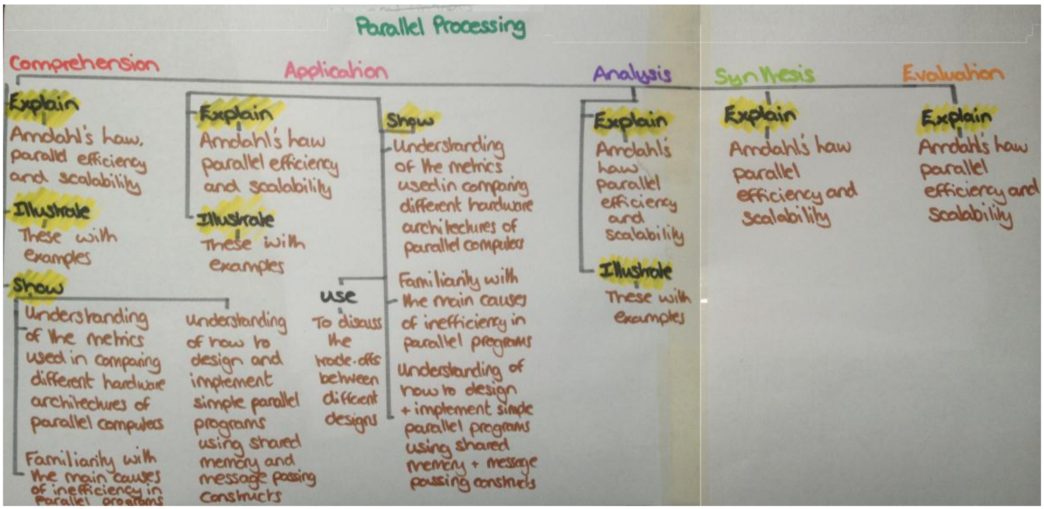
Multimedia


Multimedia
Comprehension
Demonstrate
Awareness of factors involved in multimedia systems
Show
A range of multimedia formats for text, graphics, animation, audio, images + video by detailed study of common multimedia formats
Familiarity with a range of common data compression methods
Understanding of the derivation from mathematical principles of underlying data compression algorithms
Application
Demonstrate
Awareness of factors involved in multimedia systems
Investigate
A range of multimedia formats for text, graphics, animation, audio, images + video by detailed study of common multimedia formats
How they are utilised in practical compression formats
Understanding of the derivation from mathematical principles of underlying data compression algorithms
Show
A range of multimedia formats for text, graphics, animation, audio, images + video by detailed study of common multimedia formats
Familiarity with a range of common data compression methods
Analysis
Investigate
A range of multimedia formats for text, graphics, animation, audio, images + video by detailed study of common multimedia formats
How they are utilised in practical compression formats

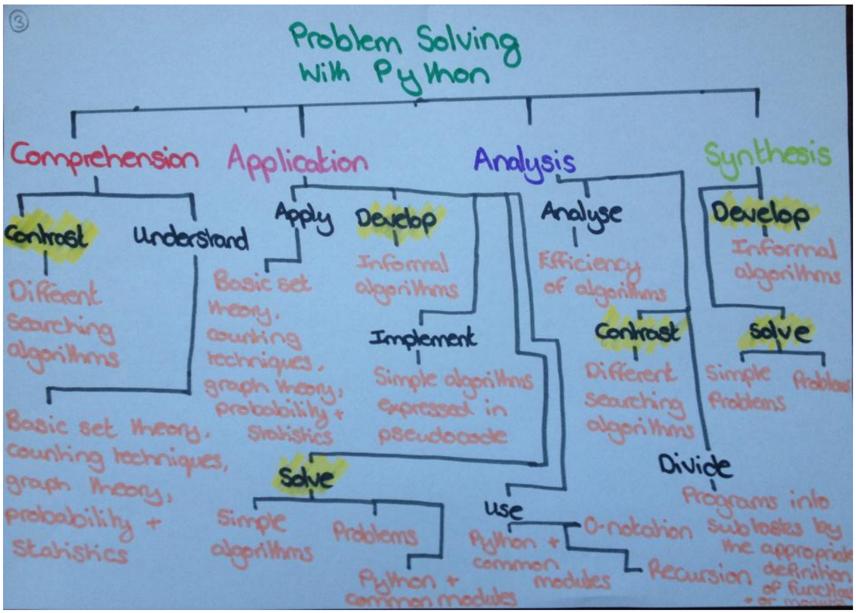
Object Oriented Applications


10
Object - Oriented Applications
Comprehension
Demonstrate
A knowledge of various techniques for use in building applications in Java
Explain
Basic object-oriented principles
A range of design patterns
Understand
object-oriented abstractions for concurrency + user interaction
Application
Apply
Principles of good object-oriented software design to the creation of robust maintainable code
Explain
Basic object-oriented principles
A range of design patterns
Demonstrate
A knowledge of various techniques for use in building applications in Java
Analysis
Explain
Basic object oriented principles
A range of design patterns
Synthesis
Explain
Basic object oriented principles
A range of design patterns
Justify
Basic object oriented principles
Evaluation
Explain
Basic object oriented principles
A range of design patterns
Justify
Basic object oriented principles

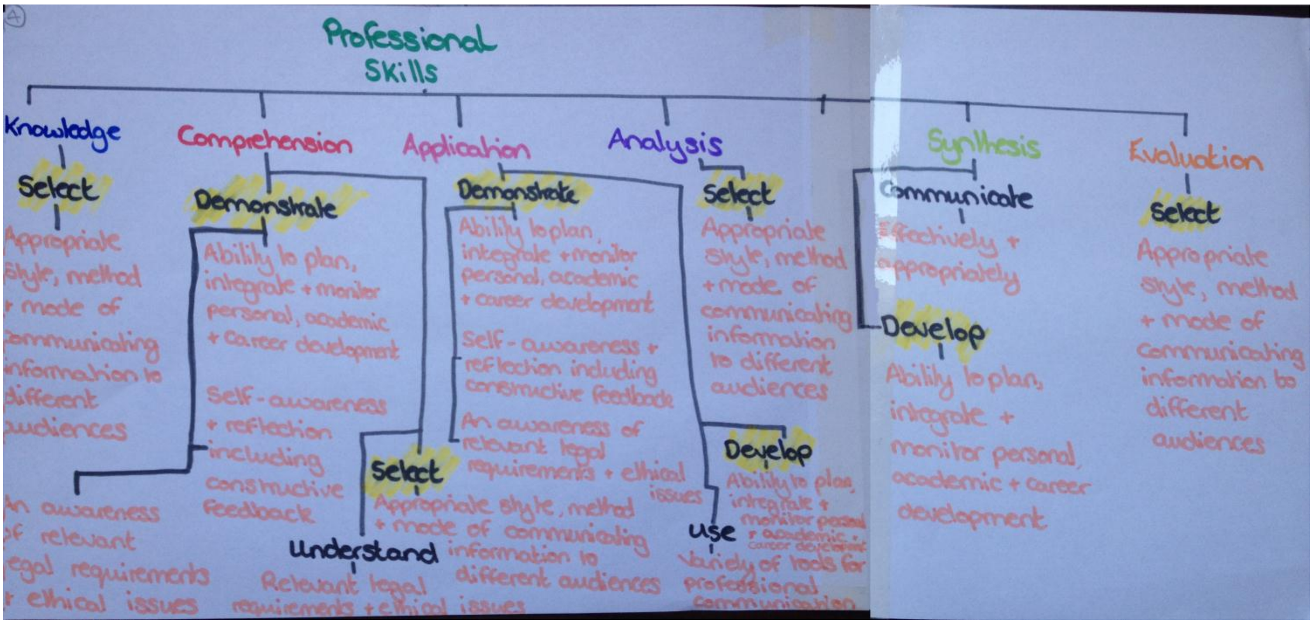
Parallel Processing


Parallel Processing
Comprehension
Explain
Amdahl's Law, parallel efficiency and scalability
Illustrate
These with examples
Show
Understanding of the metrics used in comparing different hardware architectures of parallel computers
Familiarity with the main causes of inefficiency in parallel programs
Application
Explain
Amdahl's Law parallel efficiency and scalability
Illustrate
These with examples
Understanding of how to design and implement simple parallel programs using shared memory and message passing constructs
use
To discuss the trade-offs between different designs
Show
Understanding of the metrics used in comparing different hardware architectures of parallel computers
Familiarity with the main causes of inefficiency in parallel programs
Understanding of how to design + implement simple parallel programs using shared memory + message passing constructs
Analysis
Explain
Amdahl's Law parallel efficiency and scalability
Illustrate
These with examples
Synthesis
Explain
Amdahl's Law parallel efficiency and scalability
Evaluation
Explain
Amdahl's Law parallel efficiency and scalability

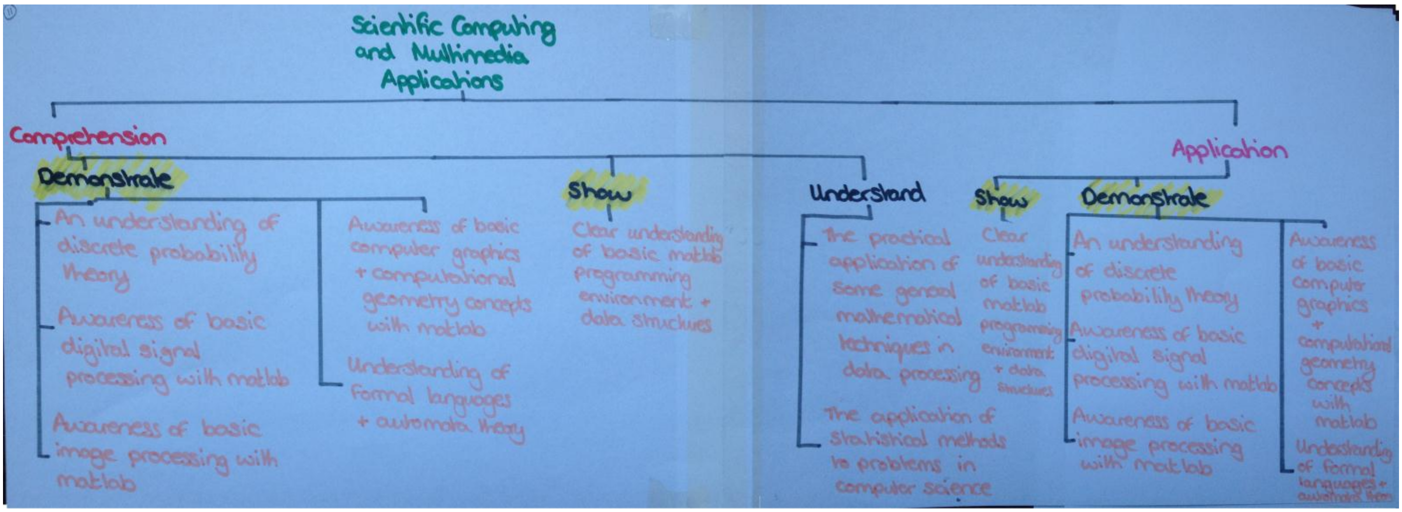
Problem Solving with Python


③
Problem Solving With Python
Comprehension
Contrast
Different searching algorithms
Understand
Basic set theory, counting techniques, graph theory, probability + statistics
Application
Apply
Basic set theory, counting techniques, graph theory, probability + statistics
Develop
Informal algorithms
Implement
Simple algorithms expressed in pseudocode
Solve
Simple algorithms
Problems
Python + common modules
Analysis
Analyse
Efficiency of algorithms
Contrast
Different searching algorithms
use
Python + common modules
O-notation
Recursion
Divide
Programs into sub tasks by the appropriate definition of functions + or modules
Synthesis
Develop
Informal algorithms
Solve
Simple problems
Problems

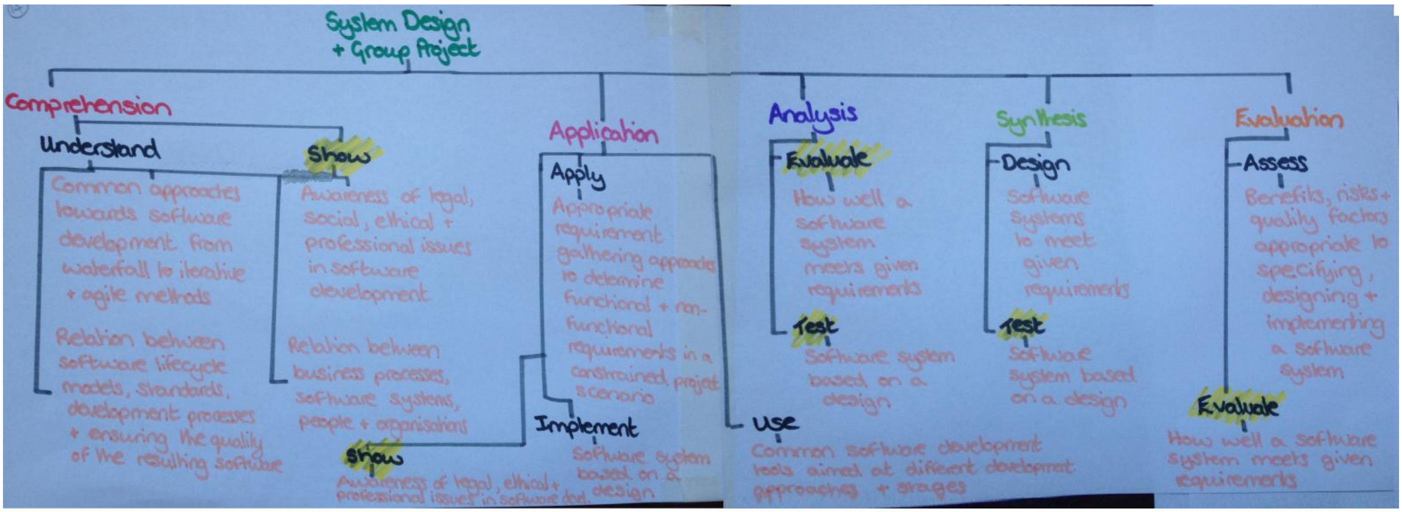
Professional Skills


④
Professional Skills
Knowledge
Select
Appropriate style, method + mode of communicating information to different audiences
An awareness of relevant legal requirements + ethical issues
Comprehension
Demonstrate
Ability to plan, integrate + monitor personal, academic + career development
Self-awareness + reflection including constructive feedback
Select
Appropriate style, method + mode of communicating information to different audiences
Understand
Relevant legal requirements + ethical issues
Application
Demonstrate
Ability to plan, integrate + monitor personal, academic + career development
Self-awareness + reflection including constructive feedback
An awareness of relevant legal requirements + ethical issues
Analysis
Select
Appropriate style, method + mode of communicating information to different audiences
Develop
Ability to plan, integrate + monitor personal + academic + career development
use
Variety of tools for professional communication
Synthesis
Communicate
Effectively + appropriately
Develop
Ability to plan, integrate + monitor personal, academic + career development
Evaluation
Select
Appropriate style, method + mode of communicating information to different audiences

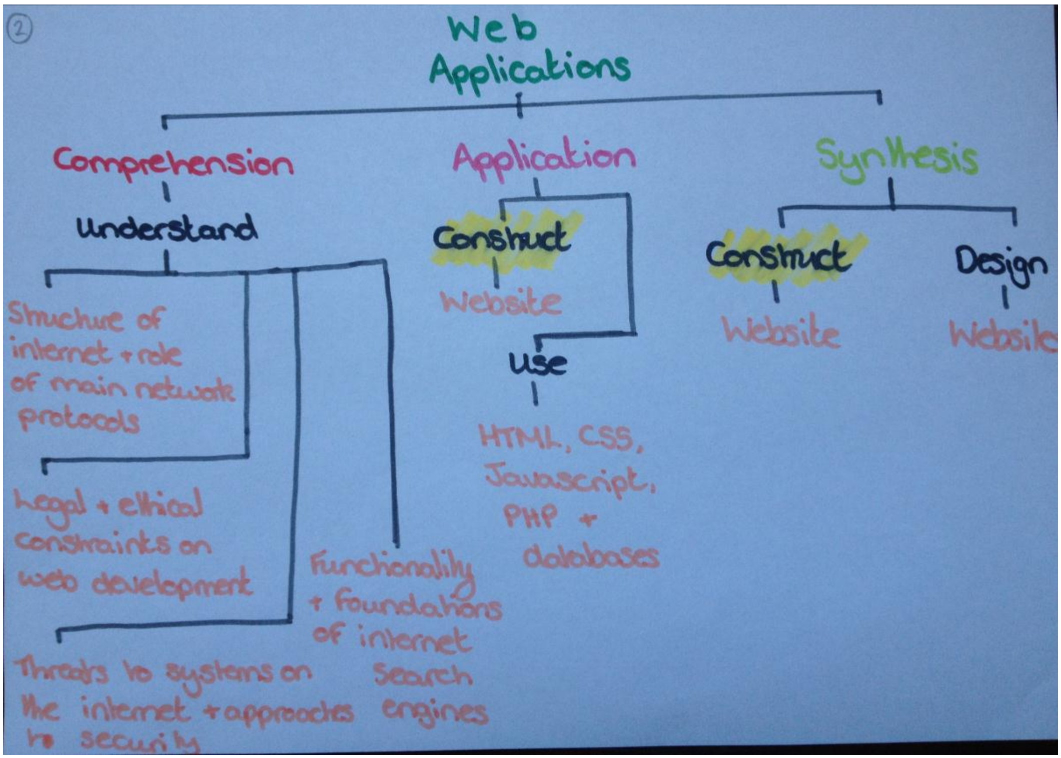
Scientific Computing and Multimedia Applications


Scientific Computing and Multimedia Applications
Comprehension
Demonstrate
An understanding of discrete probability theory
Awareness of basic digital signal processing with matlab
Awareness of basic image processing with matlab
Awareness of basic computer graphics + computational geometry concepts with matlab
Understanding of formal languages + automata theory
Show
Clear understanding of basic matlab programming environment + data structures
Understand
The practical application of some general mathematical techniques in data processing
The application of statistical methods to problems in computer science
Application
Show
Clear understanding of basic matlab programming environment + data structures
Demonstrate
An understanding of discrete probability theory
Awareness of basic digital signal processing with matlab
Awareness of basic image processing with matlab
Awareness of basic computer graphics + computational geometry concepts with matlab
Understanding of formal languages + automata theory

System Design and Group Project


System Design + Group Project
Comprehension
Understand
Common approaches towards software development from waterfall to iterative + agile methods
Relation between software lifecycle models, standards, development processes + ensuring the quality of the resulting software
Show
Awareness of legal, social, ethical + professional issues in software development
Relation between business processes, software systems, people + organisations
Application
Apply
Appropriate requirement gathering approachs to determine functional + non-functional requirements in a constrained project scenario
Implement
Software system based on a design
Show
Awareness of legal, ethical + professional issues in software dev.
Use
Common software development tools aimed at different development approaches + stages
Analysis
Evaluate
How well a software system meets given requirements
Test
Software system based on a design
Synthesis
Design
Software systems to meet given requirements
Test
Software system based on a design
Evaluation
Assess
Benefits, risks + quality factors appropriate to specifying, designing + implementing a software system
Evaluate
How well a software system meets given requirements

Web Applications


②
Web Applications
Comprehension
Understand
Structure of internet + role of main network protocols
Legal + ethical constraints on web development
Threats to systems on the internet + approaches to security
Functionality + foundations of internet search engines
Application
Construct
Website
Use
HTML, CSS, Javascript, PHP + databases
Synthesis
Construct
Website
Design
Website