

| Topics   | Lectures  | Importance |
|--|---|------------|
| Types<br>(Lab 3, 6, 10)                              | (3A) Basic types, Tuples, Polymorphism, Functions (incl. curried)<br>(3B1) Type classes, type keyword<br>(3B2) ADT: enumerated(sum), product types, and the Maybe type<br>(5A) Recursive types, newtype keyword, deriving instances | 15         |
| Conditional expressions<br>(Lab 3)                   | (3C) Function definition, if/else expression, guarded equations, pattern matching, matching lists/tuples, case/of expression, lambda expression   | 14         |
| List comprehension<br>(Lab 12)                       | (4A) Definition, guards, lookup table, the zip fn., string comprehensions   | 10         |
| Recursions<br>(Lab 5)                                | (4B) Basic recursion, recursion on lists, recursion on multiple arguments<br>(4C) Multiple recursion, advice on recursion   | 13         |
| Trees<br>(Lab 9)                                     | (5C) Functions on binary trees, types of trees,<br>(8B) List(stack) vs Tree, Abstract machine   | 11         |
| Basic IO   | (6A) Concept of a pure function and side effects, do notation and getChar, putChar (ignore everything else)   | 3          |
| Games<br>(assignments 2,3)                           | (6B) The game of Life,<br>(9A) Tic-Tac-Toe  | 2          |
| HOF<br>(Lab 8)                                       | (6C) Partial applications, the map fn., the filter fn., all/any/takeWhile/dropWhile fn-s, the zipWith fn., the composition operator (.), the application operator (\$)<br>(7A) foldl, foldr   | 12         |
| Testing and Cabal<br>toolchain<br>(Lab 4, 7)         | (7C) Cabal toolchain, Function testing: Black, White box paradigms,<br>(8A) Unit tests, Quicktest, Performance tests  | 5          |
| Game trees   | (9B) Multi-way (Rose) trees, depth first search, minimax<br>(9C) Alpha-beta pruning   | 7          |
| Lazy evaluation                                      | (10A) innermost (eager) and outermost reducible expression (redex), strict functions, lazy evaluation, infinite structures and termination, separating control from data  | 6          |
| Complexity and<br>Algorithmic efficiency<br>(Lab 11) | (10B) Computational/Space efficiency, complexity classes, Worst/Best/Average cases, Big O,<br>(10C) Complexity of the Bubble and Insertion sorts<br>(11A) Implementation aspects  | 9          |
| Search/Sort<br>(Lab 10)                              | (10B) Linear search, Bubble sort<br>(10C) Binary search, Insertion sort<br>(11A) Merge sort   | 8          |
| Reasoning about<br>programs                          | (11B) Definitions application/unapplication and equational reasoning, Proof by induction, Induction on numbers<br>(11C) Induction on lists  | 4          |