Algorithm Design & Problem Solving

Who am I??

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Thanks to **Andrea Curley** for her work
on this module

What tools will be used for module delivery?

brightspace
TUDUBLIN

❖ <u>**All**</u> **content will be delivered through Brightspace**

What tools will be used for module delivery?

❖ **Follow brightspace page for updates**

How will Brightspace be used in class?

❖ **Resources for subject areas**

❖ **All <u>notifications</u> will be on brightspace module page e.g.,**
  - ▪ **Reminders for CA submission**
  - ▪ **If required, change of time/rooms**

❖ **Useful links etc**

How does class work?

- **Mixture of slides and whiteboard.**

- **You are expected to take notes!**

- **Please ask questions during lectures!**

- **Handouts given out during class will not necessarily be posted on brightspace.**

Do you want to play cards?

Can you find me this card?

Write down in English, how you found this card.

Was there a better way?

Now ……

Sort them in the following order:

- ❖ **Spades – Ace, 2, 3, ……**
- ❖ **Clubs – Ace, 2, 3, ……**
- ❖ **Hearts – Ace, 2, 3, ……**
- ❖ **Diamonds – Ace, 2, 3, ……**

Write down in English, how you sorted this pack.

Could you have done it more quickly?

Can you find me this card again?

Write down in English, how you found this card.

How many people are in this class?

Try this algorithm ….

1. **Stand up and think of number 1**

2. **Pair off with someone standing, add your numbers together, and adopt the sum as your new number**

3. **One of you should sit down; the other should go back to step 2**

128 players, how many rounds?

From TU858 Course Document

❖ **Design algorithms** for some simple problems.

❖ Be well grounded in the use of top down design, stepwise refinement and the use of modularity.

❖ Use structure charts in top down design and describe an algorithm with **flowcharts** and **pseudocode.**

From TU858 Course Document

- ❖ Have knowledge of several **sorting** and **searching algorithms**.

- ❖ Analyse some algorithms **estimate their run time performance.**

- ❖ Implement some algorithms in a **functional language**. This will also result in a basic competency in an alternative programming paradigm.
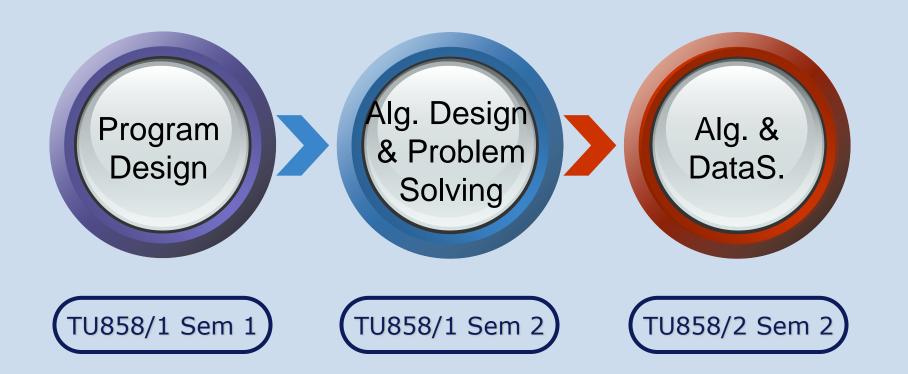
From TU858 Course Document

❖ Analyse some **puzzles** and demonstrate how state based search can be used to find a solution.

❖ Have knowledge of two quite different computational paradigms.

Where does this module fit into this course?

Program Design

Alg. Design & Problem Solving

Alg. & DataS.

TU858/1 Sem 1

TU858/1 Sem 2

TU858/2 Sem 2

Algorithm Design & Problem Solving

Module Specific Details

Lectures:
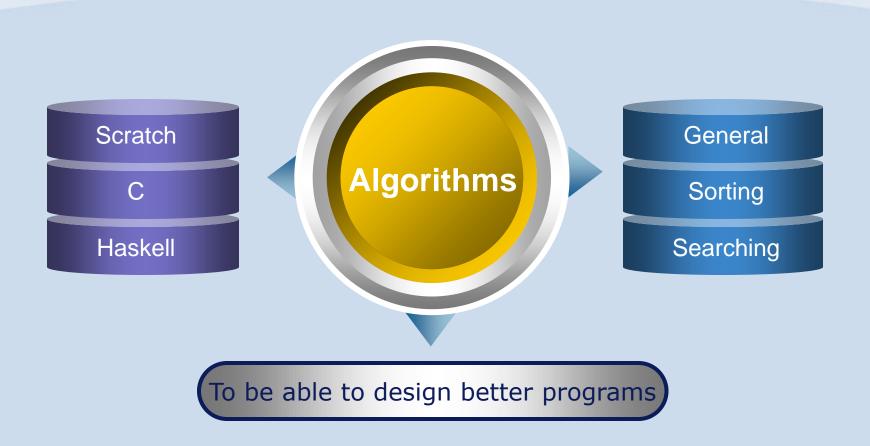- Friday*2

Tutorial:
- Friday

Lab:
- Monday

Reading List:
No specific text, but *Syllabus* section in **Brightspace** will be constantly updated and links tweeted
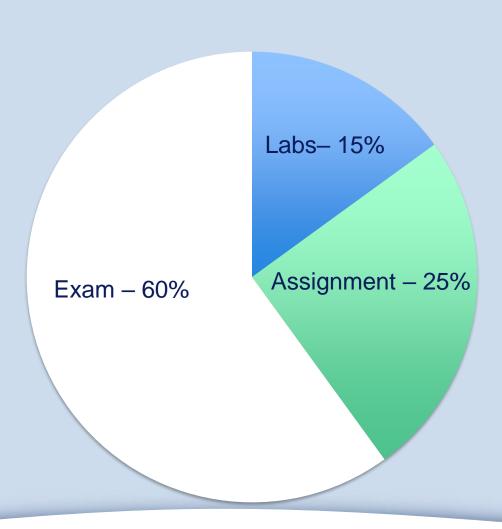
What does the module entail?

Scratch

C

Haskell

Algorithms

General

Sorting

Searching

To be able to design better programs

How is this module assessed?

Labs– 15%

Assignment – 25%

Exam – 60%

CA in detail ....

15% - Labs	25% - Assessment
Lab work for the first half of the semester	Individual assignment
	Specification given out: Week 7
Quiz x5	Full submission: start of Week 12
	Demo: Week 12 & Week 13

Other Module Details

❖Course material will be on Brightspace.

You can self-enrol on this module via Brightspace Discovery

What is an algorithm?

❖ An **algorithm** is a set of well-defined steps required to accomplish some task.

❖ They are usually involved in taking a system from one state to another.

When have you used algorithms previously?

OPERATING SUGGESTIONS

To stop the washer at any time, push the Cycle Selector (Timer) knob in.

1. **Add measured detergent directly into the washer basket.**
   Follow the detergent manufacturer's directions.

2. **Loosely load sorted clothes into the washer basket.**

3. **Add measured liquid chlorine bleach to the dispenser.**
   Do not use the dispenser for powdered chlorine bleach or color-safe bleach.
   Follow bleach manufacturer's directions for safe use.

4. **Add measured liquid fabric softener to the dispenser.**
   Follow manufacturer's directions. Add warm water to fill the dispenser until it reaches the crossed opening.

5. **Close the lid or the washer will not drain or spin.**

6. **Set the WATER LEVEL control based on the size of your wash load.**

7. **Set the WATER TEMPERATURE control based on the types of fabric and soil in the load.**
   Use an Automatic Temperature Control setting if the incoming cold water is less than 70 degrees Fahrenheit.

8. **Set the RINSE OPTIONS control.**

9. **Set the SPEEDS control for the type of fabric.**

10. **Select a cycle and wash time for the type of fabric and soil level of the load.**
    Push the Cycle Selector (Timer) knob in. Turn the knob to the right to the desired cycle and time.
    Use more time for heavily soiled loads, less time for lightly soiled loads.

11. **Pull the Cycle Selector (Timer) knob out to start the washer.**

ALOE VERA
MOISTURIZING SHAMPOO

SHAMPOOING HYDRATANT
A L'ALOÈS

Apply to wet hair. Work into rich lather.
Rinse thoroughly. Repeat if necessary.
Cleanses hair while restoring healthy body
and shine. Contains aloe vera leaf extract.

Recipes!

Equipment:

CARAMEL POPCORN

1 tbsp butter
2 tbsp brown sugar
1/4 tsp vanilla
1/4 tsp salt

POPCORN SNOWBALLS

2 cups mini-marshmallows
1 tbsp butter
1/2 cup halved pecans
1/2 cup cranberries/currants

HERBERT'S RECIPE FOR DISASTER

Work with a parent or guardian.

Pop a bag of plain popcorn, then transform it into an explosion of flavor.

CARAMEL POPCORN

Difficulty level: 🍿🍿

Your Orders:

1. Empty popcorn into a large bowl and remove any un-popped kernels.
2. Mix everything else together in a microwave-safe bowl.
3. Microwave for 10 seconds at a time until melted, stirring in between.
4. Pour the mixture over the popcorn, then stir until all kernels are coated.

POPCORN SNOWBALLS

Difficulty level: 🍿🍿🍿🍿

Your Orders:

1. Empty popcorn into a large bowl and remove any un-popped kernels.
2. Add butter to the marshmallows in a microwave-safe bowl.
3. Microwave for 10 seconds at a time until melted, stirring in between.
4. Stir marshmallow mixture into the popcorn until all kernels are coated. Add the rest of the ingredients and stir.
5. Once the popcorn is cool enough to touch, shape it into snowballs.
6. Place the popcorn snowballs onto a sheet of wax paper until fully cooled.

To defuse these dangerously delicious popcorn devices, eat immediately. **And now, a message from Herbert: "What can I say, revenge is sweet!"**

Another algorithm …..