

# Semantic-UI Part IV

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## Programming

Learn a broad range of programming and problem solving skills, including exciting new platforms, software tools and languages. Use these skills to build apps for mobile, cloud and device based IoT applications. Evolve a portfolio of fascinating applications.

## Data Science

At the heart of many IoT applications is data: measurements, events alarms and other information that must be relayed, stored and ultimately turned into knowledge. Learn the fundamentals of modern approaches to data in this strand.

## Devices

The 'Things' we connect to are often physical devices. These can range from simple temperature sensors to sophisticated control systems like traffic lights or cameras. Connecting to and interacting with the physical world is the subject of this strand.

## Networks

This strand will explore modern networks and cloud technology. Be able to configure, network and manage all categories of computer systems from simple controllers to single board computers, mobiles and full workstations.

## Project

Building exciting IoT projects in every semester of the programme. Your projects will combine skills acquired from the other strands and enable you to build a comprehensive and compelling portfolio of IoT applications and services.

## Mathematics

Introduce foundation concepts for many of the more applied concepts in the other Strands. Learn mathematical techniques in a modern context and apply core principles in new and interesting ways.

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Department of Computing & Mathematics



Waterford Institute of Technology  
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## **BSc (Hons) in the Internet of Things**

## Programming

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Supported by leading edge research

TSSG





# Icons

---

[facebook](#) [twitter](#) [linkedin](#)

```
<footer class="ui segment">
  <p class="footer-social-links">
    <a href="http://www.facebook.com/witcomp"> facebook </a>
    <a href="http://twitter.com/ComputingAtWIT"> twitter </a>
    <a href="https://ie.linkedin.com/pub/computing-at-wit/a9/221/1b6"> linkedin </a>
  </p>
</footer>
```



```
<footer class="ui center aligned segment">
  <a href="http://www.facebook.com/witcomp"> <i class="large facebook icon"></i> </a>
  <a href="http://twitter.com/ComputingAtWIT"> <i class="large twitter icon"></i> </a>
  <a href="http://www.linkedin.com/pub/computing-at-wit"> <i class="large linkedin icon"></i> </a>
</footer>
```

# Colours

<http://semantic-ui.com/usage/theming.html>

site/globals/site.variables

less

```
@primaryColor      : @pink;  
@secondaryColor    : @grey;  
@red               : #B03060;  
@orange             : #FE9A76;  
@yellow             : #FFD700;  
@olive              : #32CD32;  
@green              : #016936;  
@teal               : #008080;  
@blue               : #0E6EB8;  
@violet              : #EE82EE;  
@purple              : #B413EC;  
@pink               : #FF1493;  
@brown              : #A52A2A;  
@grey               : #A0A0A0;  
@black              : #000000;
```

Primary Button

Secondary Button

ALL COLORS

Red

Orange

Yellow

Olive

Green

Teal

Blue

Violet

Purple

Pink

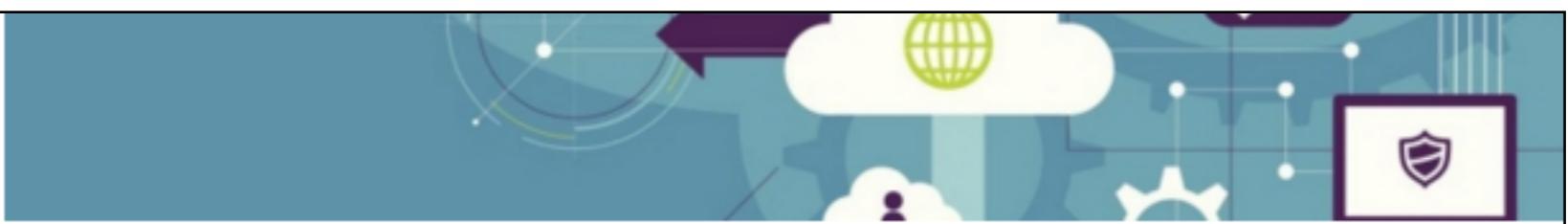
Brown

Grey

Black

```
<article class="red column">
  <h2> <a href="strands/programming.html"> Programming </a> </h2>
  <p>
    Learn a broad range of programming and problem solving skills, including exciting new p
    languages. Use these skills to build apps for mobile, cloud and device based IoT applic
    facinating applications.
  </p>
</article>
```





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```
<section class="ui three column row">

  <article class="red column">
    ...
  </article>

  <article class="orange column">
    ...
  </article>

  <article class="yellow column">
    ...
  </article>

</section>

<section class="ui three column row">

  <article class="olive column">
    ...
  </article>

  <article class="green column">
    ...
  </article>

  <article class="blue column">
    ...
  </article>

</section>
```

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## Networks

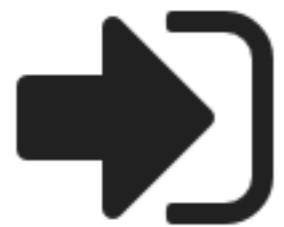
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## Programming

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```
<i class="huge settings icon"></i>
<i class="huge bar chart icon"></i>
<i class="huge space shuttle icon"></i>
<i class="huge cloud upload icon"></i>
<i class="huge lab icon"></i>
<i class="huge wizard icon"></i>
```

```
<article class="red column">
  <h2> Programming </h2>
  <p>
    Learn a broad range of programming and problem solving skills
  </p>
  <div class="ui two column grid">
    <div class="left aligned column">
      <i class="huge settings icon"></i>
    </div>
    <div class="right aligned column">
      <a href="strands/programming.html" class="strandlink">
        <i class="huge sign in icon"></i>
      </a>
    </div>
  </div>
</article>
```

## Programming

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- Encapsulate icons in 2 column grid
  - Left align first icon
  - Right align second icon

# Raised Segment

## Raised



A segment may be formatted to raise above the page.

### Example



Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Vestibulum tortor quam, feugiat vitae, ultricies eget, tempor sit amet, ante. Donec eu libero sit amet quam egestas semper. Aenean ultricies mi vitae est. Mauris placerat eleifend leo.

```
<div class="ui raised segment">
  <p>Pellentesque habitant morbi tristique senectus et netus et
  malesuada fames ac turpis egestas. Vestibulum tortor quam, feugiat
  vitae, ultricies eget, tempor sit amet, ante. Donec eu libero sit amet
  quam egestas semper. Aenean ultricies mi vitae est. Mauris placerat
  eleifend leo.</p>
</div>
```

# Padded Segment

---

## Padded



A segment can increase its padding

### Example



```
<div class="ui padded segment">  
  <p></p>  
</div>
```

# Stacked Segment

## Stacked



A segment can be formatted to show it contains multiple pages

### Example



Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Vestibulum tortor quam, feugiat vitae, ultricies eget, tempor sit amet, ante. Donec eu libero sit amet quam egestas semper. Aenean ultricies mi vitae est. Mauris placerat eleifend leo.

```
<div class="ui stacked segment">
  <p>Pellentesque habitant morbi tristique senectus et netus et malesuada
fames ac turpis egestas. Vestibulum tortor quam, feugiat vitae, ultricies
eget, tempor sit amet, ante. Donec eu libero sit amet quam egestas semper.
Aenean ultricies mi vitae est. Mauris placerat eleifend leo.</p>
</div>
```

## <section class="ui three column padded stacked grid segment">

### Programming

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## Programming



The IoT requires a new breed of software skills, with an emphasis on flexible, reactive, and highly networked applications and services. This software runs on a diverse range of systems, is frequently connected to cloud services, and may be capable of leveraging large data sets to deliver inferences and decision support in an informed manner. The software is designed and implemented using agile techniques, with an emphasis on test driven development and quality user experiences..

Year 1

Semester 1

Semester 2

Semester 3

Year 2

Year

Semester 4

Semester 5

Programming Fundamentals I

Programming Fundamentals II

Web Development I

Web Development II

### Programming Learning Path

The Data Science strand will begin with the fundamentals of relational databases used to store structured transactions and descriptive analysis required to predict future events and to identify relationships in data. In the third year the students will manage unstructured data (such as text and images) using databases and data warehouses (supporting consistent views of a domain, and as a result, making it easier to share data between different systems). In the fourth year the students will learn how to work with big data (large volumes of data) in terms of storage and analytics. The students will learn how to design appropriate data solutions with a complete understanding and knowledge of the available options. The students will also learn how to work with machine learning and deep learning algorithms to extract meaningful insights from data.

- Images set to default size

- Text not positioned correctly

```

<article>
  <h1> Programming </h1>
  <p>
    
    The IoT requires a new breed of software skills, with an emphasis on flexible, reactive, and highly networked applications and services. This software runs on a diverse range of systems, is frequently connected to cloud services, and may be capable of leveraging large data sets to deliver inferences and decision support in an informed manner. The software is designed and implemented using agile techniques, with an emphasis on test driven development and quality user experiences..
  </p>
</article>

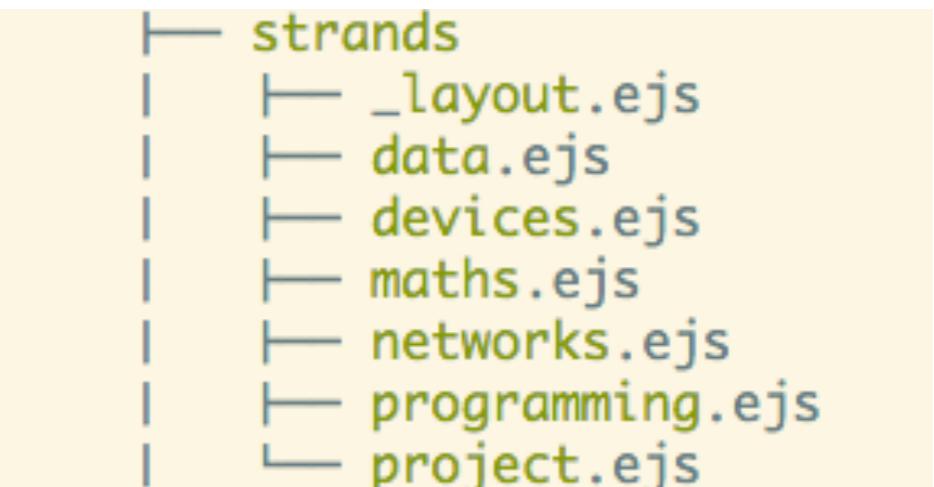
<figure>
  
  
</figure>

<article>
  <h2> Programming Learning Path </h2>
  <p>
    The Data Science strand will begin with the fundamentals of relational databases used to store structured transactions and descriptive analysis required to predict future events and to identify relationships in data. In the third year the students will manage unstructured data (such as text and images) using databases and data warehouses (supporting consistent views of a domain, and as a result, making it easier to share data between different systems). In the fourth year the students will learn how to work with big data (large volumes of data) in terms of storage and analytics. The students will learn how to design appropriate data solutions with a complete understanding and knowledge of the available options. The students will also learn how to work with machine learning and deep learning algorithms to extract meaningful insights from data.
  </p>
</article>

```

# \_layout.ejs

- A common layout
- All pages in strands folder based on this layout
  - Any change to \_layout.ejs
    - —> immediately changes all strands pages



The screenshots show three different pages from the Waterford Institute of Technology website:

- Mathematics**: A page with a sidebar titled "Math" and a main content area for "Mathematics". It includes sections for "Discrete Mathematics", "Applied Calculus", "Mathematical Methods", and "Statistics & Probability".
- Networks**: A page with a sidebar titled "Math" and a main content area for "Networks". It includes sections for "Computer Systems I" and "Computer Systems II".
- Mathematics Learning Path**: A page with a sidebar titled "Math" and a main content area for "Mathematics Learning Path". It features a circular diagram with mathematical symbols like  $\pi$ ,  $\theta$ , and  $x$ .

The pages are identical in layout, demonstrating how changes made to the \_layout.ejs template affect all pages in the strands folder.

# \_layout.ejs

```
...
<body>
  <section class="ui container">
    <%- partial("../includes/_header.ejs") %>
    <section class="ui grid segment">
      <%- yield %>
    </section>
    <%- partial("../includes/_footer.ejs") %>
  <section>
</body>
...

```

- Make the segment a ‘grid’
- Rework each strand page to row/column structure
- + use ‘ui image’ for consistent image sizing

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The diagram illustrates the IoT architecture components and their relationships. At the center is the 'Domain Model'. Surrounding it are several interconnected layers: 'Events' (yellow), 'User Interfaces' (light blue), 'Icons' (medium blue), 'Widgets' (dark blue), 'Sitemaps' (cyan), 'User Interfaces' (light blue), 'IoT/Cloud' (cyan), 'Persistence' (green), 'Logging' (teal), 'REST API' (pink), 'Connectivity' (light pink), 'Discovery' (pink), 'Triggers' (light blue), 'Actions' (medium blue), 'Automation' (dark blue), 'Modules' (cyan), and 'Bindings' (pink). Arrows indicate the flow of data and interactions between these components.

A curriculum timeline showing courses across four years:

Year	Semester	Courses
Year 1	Semester 1	Programming Fundamentals I
	Semester 2	Programming Fundamentals II
Year 2	Semester 3	Algorithms
	Semester 4	Data Structures
Year 3	Semester 5	Application Development
	Semester 6	
Year 4	Semester 7	Distributed Systems I
	Semester 8	Distributed Systems II

A screenshot of a code editor showing a snippet of Python code. The code appears to be related to a database or file system, involving operations like `add\_or\_remove\_shortcut`, `remove\_shortcut`, and `get\_resource\_type`. It includes comments explaining the logic of positioning items next to each other and handling prefixes and suffixes.

**Learning Paths**

The Data Science strand will begin with the fundamentals of relational databases used to store structured transactional business data. This data holds the basis for reporting and descriptive analysis required to predict future events and to identify relationships in data. In the third year the students will extend their knowledge to NoSQL (especially for managing unstructured data) databases and data warehouses (supporting consistent views of a domain, and as a springboard for statistics and machine learning analyses). In the IoT context the importance of dealing with large volumes of data in terms of storage and analytics is great. The skills they learn will allow them to design and implement the appropriate data solution with a complete understanding and knowledge of the available options. The students will learn about the trade-offs in terms of consistency, availability and partitioning. In the fourth year students will learn and implement the skills of data mining covering classification, prediction and clustering, applied to data that had been managed using methods and technologies they have learned about in previous years.

[f](#) [t](#) [in](#)

# ui grid

---

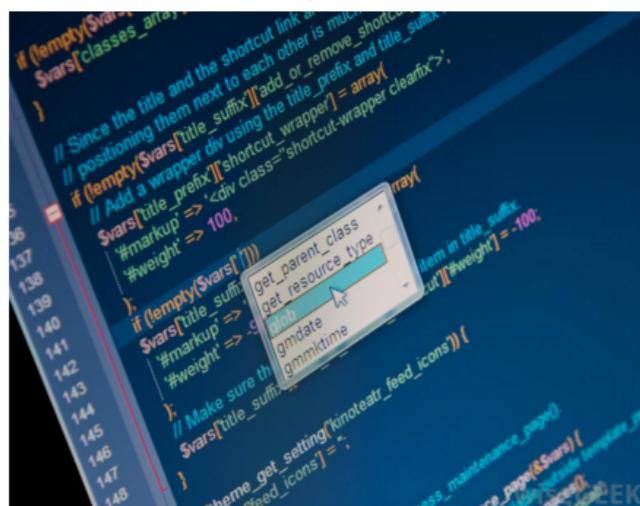
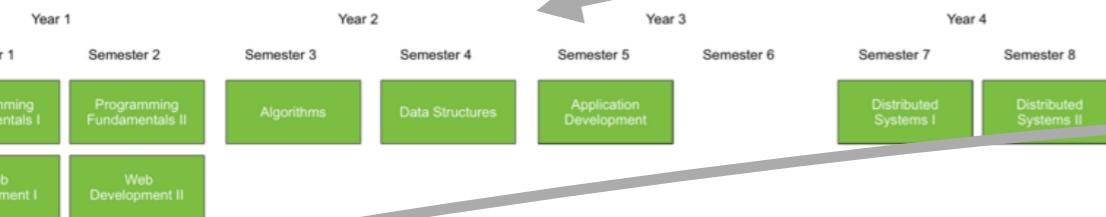
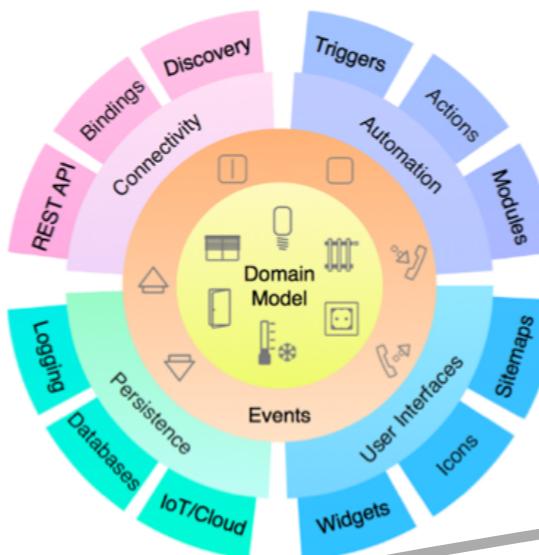
- Each grid is 16 units
- “eight wide” consumes half the available width
- ‘sixteen wide’ consumes full available width

```
<article class="eight wide column">
  <h1> Programming </h1>
  <p>
    The IoT requires a new breed of software skills, with an emphasis on f...
  </p>
</article>

<aside class="eight wide column">
  
  
  
  
  <h2> Learning Paths </h2>
  <p>
    The Data Science strand will begin with the fundamentals of relational...
  </p>
</section>
```

## Programming

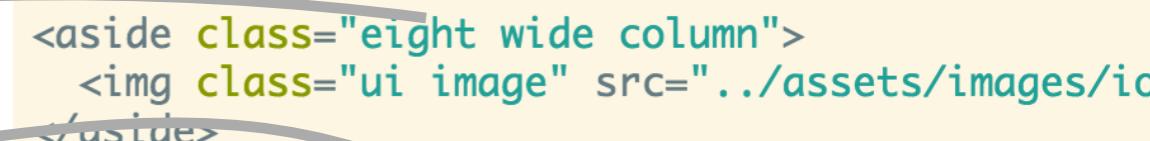
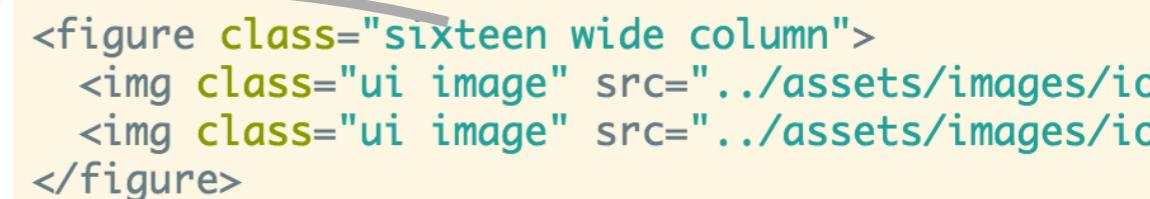
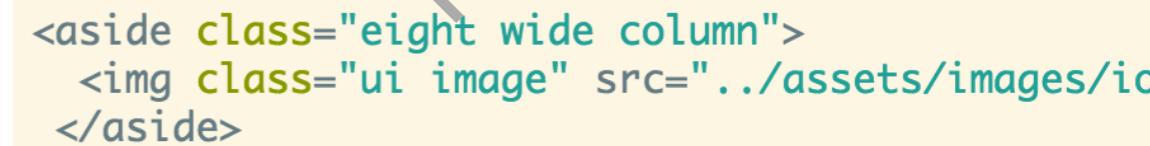
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```
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  <p>
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  </p>
</article>
```



```
<section class="eight wide column">
  <h2> Learning Paths </h2>
  <p>
    The Data Science strand will begin with the
  </p>
</section>
```

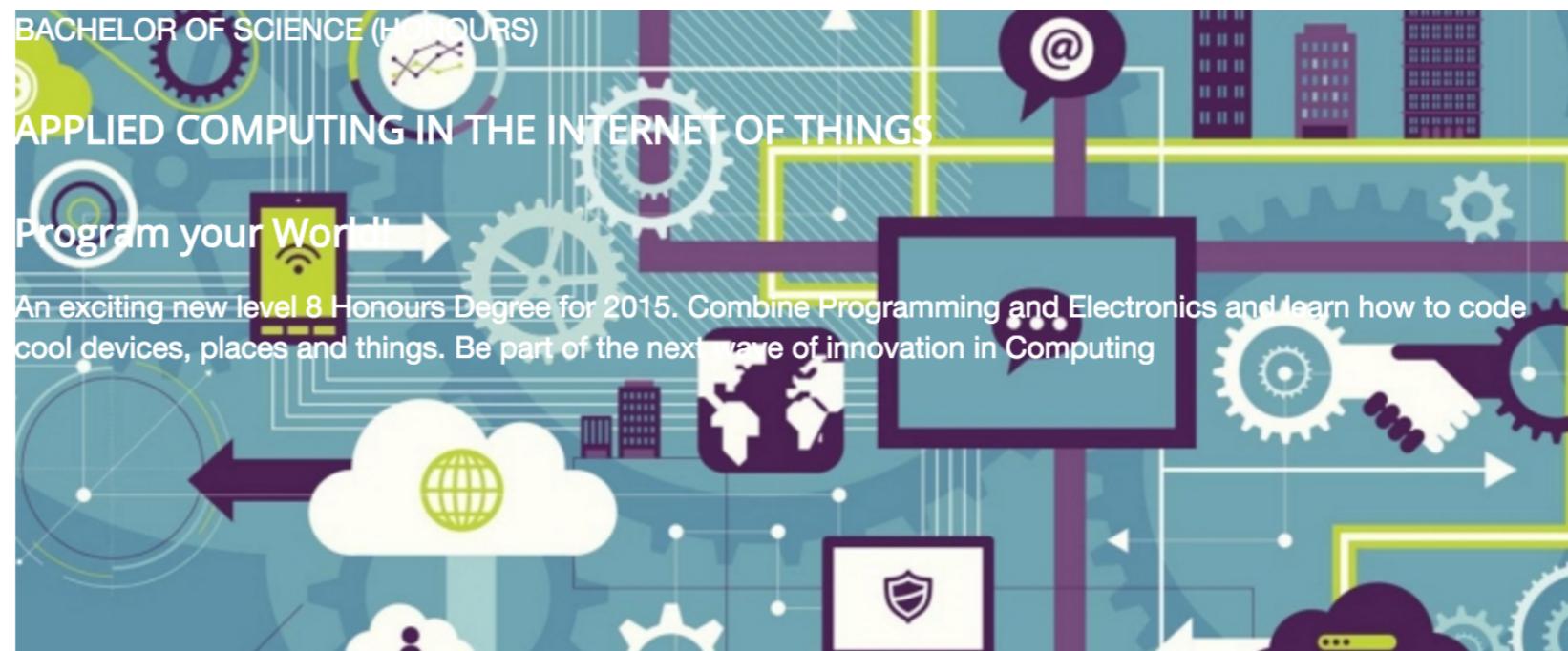
- We could have used ‘ui row’ as well, but just using cols will also suffice

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## BSc (Hons) the Internet of Things



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Banner  
Segment  
-current

# background image

```
.banner {  
    background: url("/assets/images/banner.jpg") top center;  
    background-position: top center;  
    color: white;  
    height: 300px;  
}
```

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <link rel="stylesheet" type="text/css" href="http://fonts.googleapis.com/...
  <link rel="stylesheet" href="assets/css/semantic.css">
  <link type="text/css" rel="stylesheet" href="style.css" media="screen"/>
  <title>BSc in the Internet of Things</title>
</head>
<body>
  <section class="ui container">
    <%= partial("includes/_header.ejs") %>
    <%= partial("includes/_summary.ejs") %>
    <%= partial("includes/_curriculum.ejs") %>
    <%= partial("includes/_sponsors.ejs") %>
    <%= partial("includes/_footer.ejs") %>
  </section>
</body>
</html>
```

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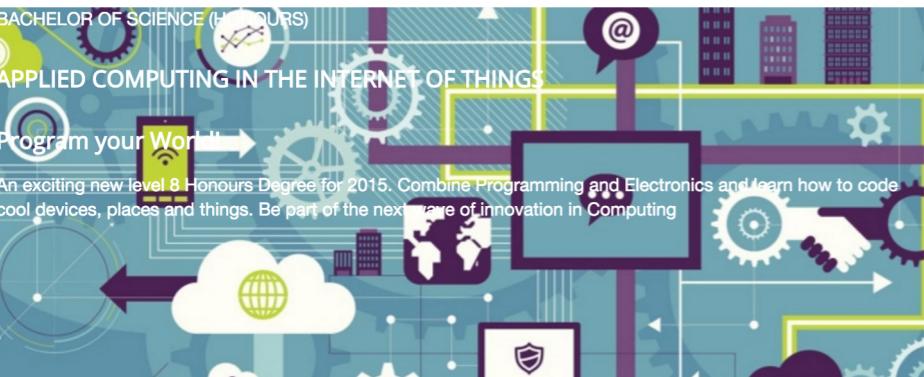
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## BSc (Hons) the Internet of Things

**BACHELOR OF SCIENCE (HONS) COURSES**

### APPLIED COMPUTING IN THE INTERNET OF THINGS

Program your World!!



An exciting new level 8 Honours Degree for 2015. Combine Programming and Electronics and learn how to code cool devices, places and things. Be part of the next wave of innovation in Computing

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```
<article class="banner">
  <div>
    <p>
      BACHELOR OF SCIENCE (HONOURS)
    </p>

    <h3>
      APPLIED COMPUTING IN THE INTERNET OF THINGS
    </h3>

    <h3>
      Program your World!
    </h3>
    <p>
      An exciting new level 8 Honours Degree for 2015. Combine Programming
      to code cool devices, places and things. Be part of the next wave of
    </p>
  </div>
</article>
```

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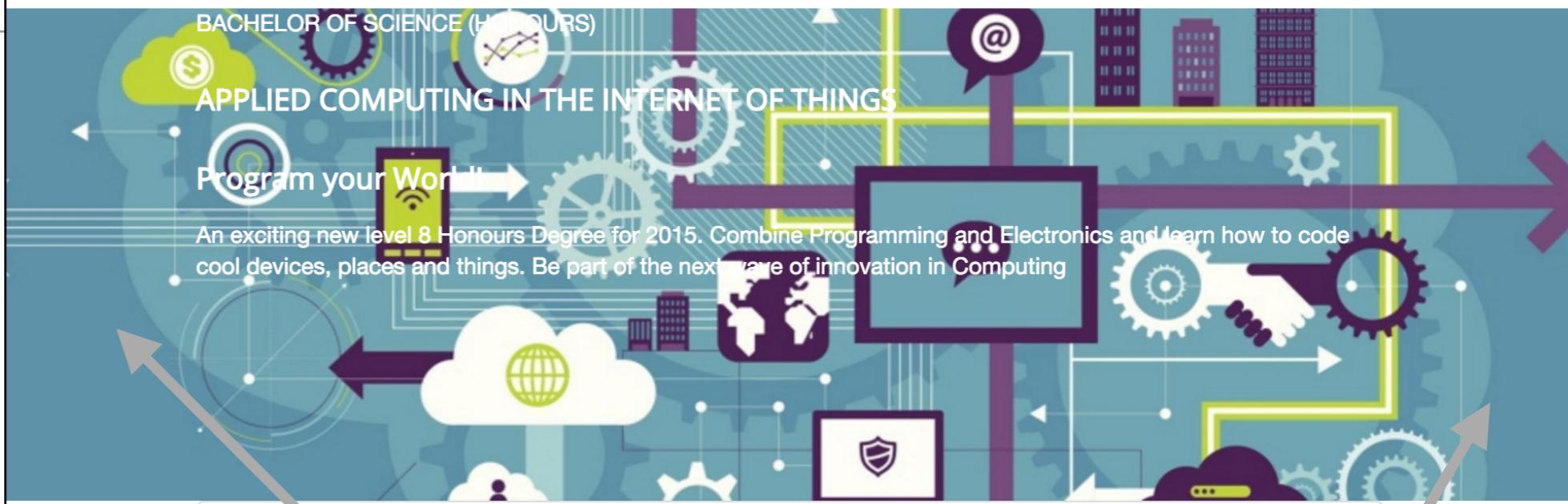
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## BSc (Hons) the Internet of Things

Department of Computing & Mathematics



BSc (Hons) the Internet of Things



```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <link rel="stylesheet" type="text/css" href="http://fonts.googleapis.com/css?family=Open+Sans+Condensed:300&subset=latin-ext">
  <link rel="stylesheet" href="assets/css/semantic.css">
  <link type="text/css" rel="stylesheet" href="style.css" media="screen">
  <title>BSc in the Internet of Things</title>
</head>
<body>
  <section class="ui container">
    <%= partial("includes/_header.ejs") %>
  </section>
  <section class="banner">
    <section class="ui container">
      <%= partial("includes/_summary.ejs") %>
    </section>
  </section>
  <section class="ui container">
    <%= partial("includes/_curriculum.ejs") %>
    <%= partial("includes/_sponsors.ejs") %>
    <%= partial("includes/_footer.ejs") %>
  </section>
</body>
```

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- Stretch the background image to the edges

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#### Programming

Learn the fundamental concepts of programming and

#### Data Science

At the forefront of many IoT applications is

#### Devices

The IoT is built upon connected devices that

```

<section class="ui grid">
  <article class="ui seven wide column raised blue segment">
    <div>
      <p>
        BACHELOR OF SCIENCE (HONOURS)
      </p>

      <h3>
        APPLIED COMPUTING IN THE INTERNET OF THINGS
      </h3>

      <h3>
        Program your World!
      </h3>
      <p>
        An exciting new level 8 Honours Degree for 2015. Combine Programming and Electronics and learn how to code cool devices, places and things. Be part of the next wave of innovation in Computing
      </p>
    </div>
  </article>
</section>

```

```

<body>
  <section class="ui container">
    <%= partial("includes/_header.ejs") %>
  </section>
  <section class="banner">
    <section class="ui container">
      <%= partial("includes/_summary.ejs") %>
    </section>
  </section>
  <section class="ui container">
    <%= partial("includes/_curriculum.ejs") %>
    <%= partial("includes/_sponsors.ejs") %>
    <%= partial("includes/_footer.ejs") %>
  </section>
</body>

```

## Department of Computing & Mathematics

BSc (Hons) the Internet of Things



Waterford Institute of Technology  
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE

BACHELOR OF SCIENCE (HONOURS)

**APPLIED COMPUTING IN THE INTERNET OF THINGS**

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Programming

Data Science

Devices

# Computing & Mathematics



Waterford Institute of Technology  
www.wit.ie/witbites/internet-of-things

BSc (Hons) the  
Internet of  
Things

## Programming

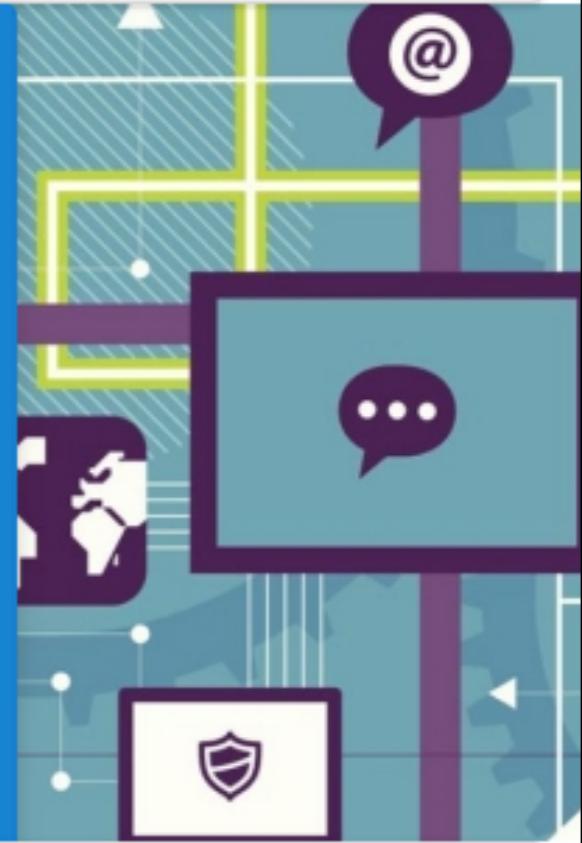
The IoT requires a new breed of software skills, with an emphasis on flexible, reactive, and highly networked applications and services. This software runs on a diverse range of systems, is frequently connected to cloud services, and may be capable of leveraging large data sets to deliver inferences and decision support in



BACHELOR OF  
SCIENCE  
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COMPUTING  
IN THE  
INTERNET OF  
THINGS

Program your  
World!



### Program

Learn a broad range of programming and problem solving skills, including exciting new platforms,

### Data Science

At the heart of many IoT applications is data: measurement events, alarms and other information that must

### Devices

The 'Things' we connect to are often physical devices. These can range from simple temperature sensors to

# Unresponsive Layouts



## Programming

The IoT requires a new breed of software skills, with an emphasis on flexible, reactive, and highly networked applications and services. This software runs on a diverse range of systems, is frequently connected to cloud services, and may be capable of leveraging large data sets to deliver inferences and decision support in an informed manner. The software is designed and implemented using agile techniques, with an emphasis on test driven development and quality user experiences..



Year 1		Year 2		Year 3		Year 4	
Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6	Semester 7	Semester 8
Programming Fundamentals I	Programming Fundamentals II	Algorithms	Data Structures	Application Development		Distributed Systems I	Distributed Systems II
Web Development I	Web Development II						

## Programming

Learn a broad range of programming and problem solving skills, including exciting new platforms, software tools and languages. Use these skills to build apps for mobile, cloud and device based IoT applications. Evolve a portfolio of fascinating applications.



## Data Science

At the heart of many IoT applications is data: measurements, events alarms and other information that must be relayed, stored and ultimately turned into knowledge. Learn the fundamentals of modern approaches to data in this strand.



## Devices

The 'Things' we connect to are often physical devices. These can range from simple temperature sensors to sophisticated control systems like traffic lights or cameras. Connecting to and interacting with the physical world is the subject of this strand.



# Responsive Layouts

## Networks

This strand will explore modern networks and cloud technology. Be able to configure, network and manage all categories of computer systems from simple controllers to single board computers, mobiles and full workstations.



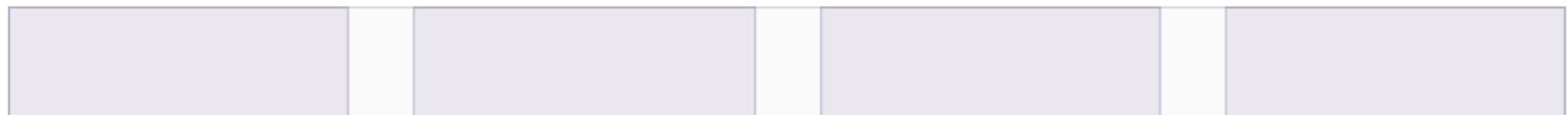
## Grids

A grid is a structure with a [long history](#) used to align negative space in designs.

Using a grid makes content appear to flow more naturally on your page.



Toggle Animation



## Columns

Grids divide horizontal space into indivisible units called "columns". All columns in a grid must specify their width as proportion of the total available row width.

All grid systems chooses an arbitrary column count to allow per row. Semantic's default theme [uses 16 columns](#).



## Responsive Grids

### Introduction

Grids

Columns

Rows

Gutters

Negative Margins

Page Grids

### Columns

### Rows

### Varying Grids

### Responsive Grids

Containers

Stackable

Reverse Order

Doubling

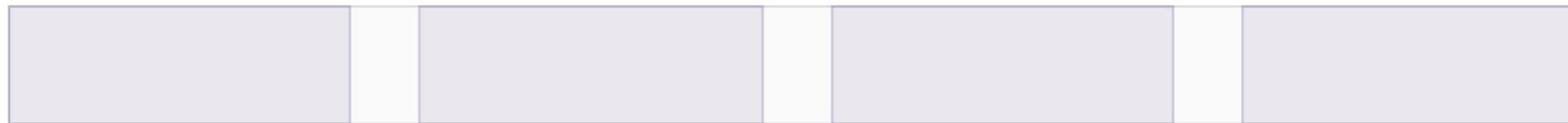
Manual Tweaks

## Stackable



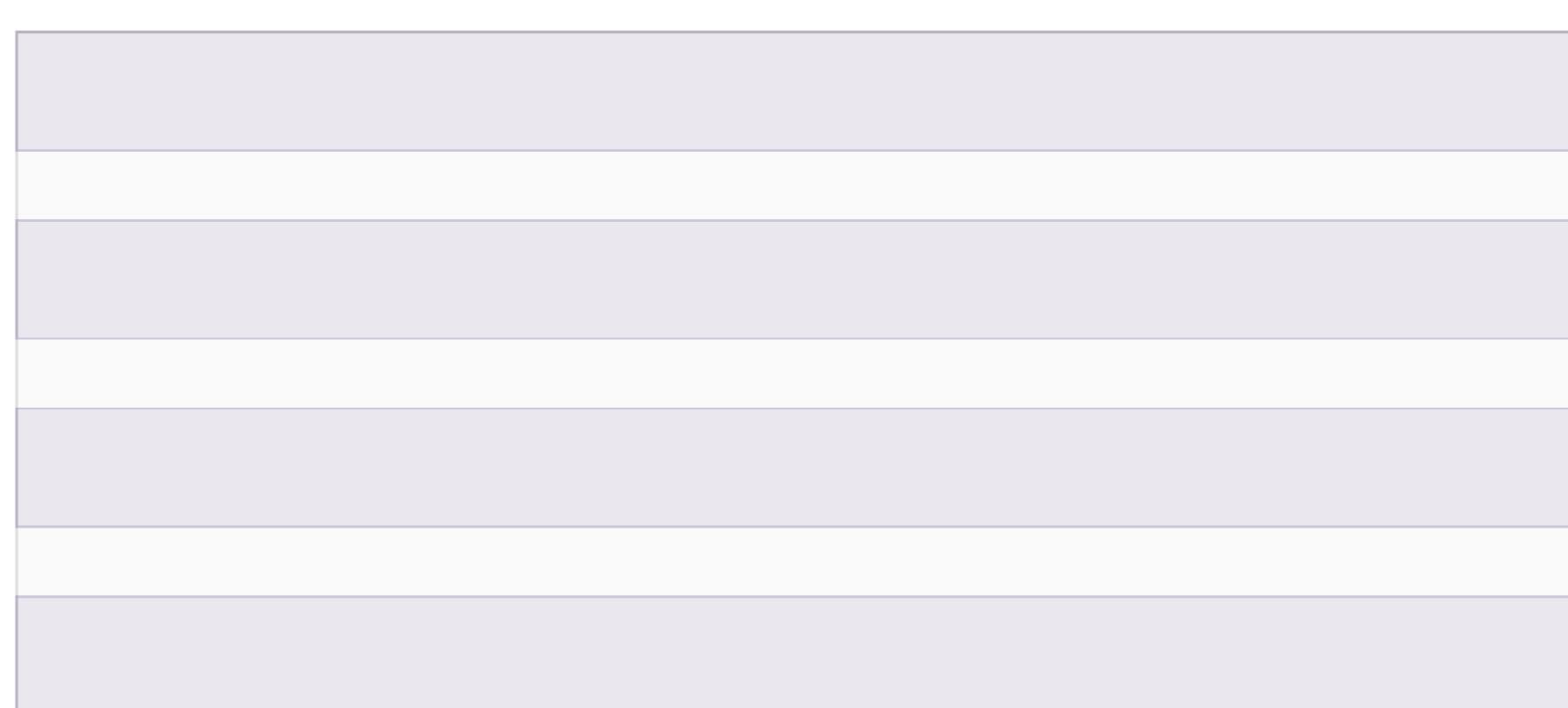
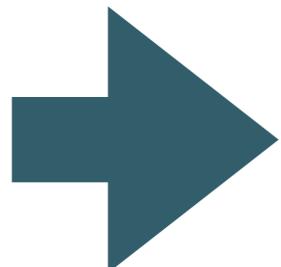
A **stackable grid** will automatically stack rows to a single columns on mobile devices

Example



```
<div class="ui stackable four column grid">
  <div class="column"></div>
  <div class="column"></div>
  <div class="column"></div>
  <div class="column"></div>
</div>
```

- Grid elements  
‘stackable’ if  
the browser  
width to narrow

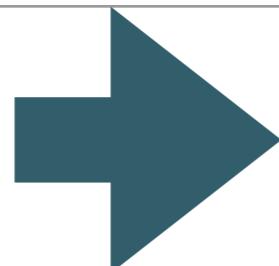


# Computing & Mathematics



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Internet of  
Things



# Department of Computing & Mathematics

BSc (Hons) the Internet of Things



Waterford Institute *of* Technology  
INSTITIÚID TEICNEOLAÍOCHTA PHORT LÁIRGE

```
<header class="ui two column center aligned middle aligned stacked stackable grid segment">
  <div class="column">
    <h2 class="ui header"> Department of Computing & Mathematics </h2>
    <h3 class="ui header"> BSc (Hons) the Internet of Things </h3>
  </div>
  <div class="column">
    <p>
      
    </p>
  </div>
</header>
```

- Distinguish between ‘stackable’ and ‘stacked’?

## Programming

Learn a broad range of programming and problem solving skills, including exciting new platforms, software tools and languages. Use these skills to build apps for mobile, cloud and device based IoT applications. Evolve a portfolio of fascinating applications.



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# Stackable

```
<section class="ui three column padded stacked stackable grid segment">

  <article class="red column">
    <h2> Programming </h2>
    <p>
      Learn a broad range of programming and problem solving skills, including software tools and languages. Use these skills to build apps for mobile IoT applications. Evolve a portfolio of fascinating applications.
    </p>
    <div class="ui two column grid">
      <div class="left aligned column">
        <i class="huge settings icon"></i>
      </div>
      <div class="right aligned column">
        <a href="strands/programming.html">
          <i class="huge sign in icon"></i>
        </a>
      </div>
    </div>
  </article>
</section>
```

- ‘stackable grid’ class makes all columns in the grid stack up as browser narrows

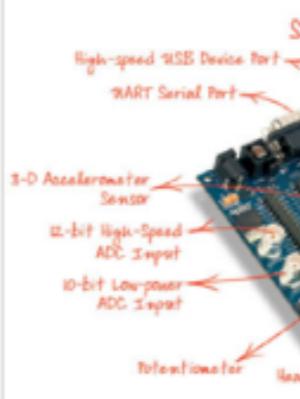
# \_layout.ejs

```
<body>
  <section class="ui container">
    <%- partial("../includes/_header.ejs") %>
    <section class="ui stackable grid segment">
      <%- yield %>
    </section>
    <%- partial("../includes/_footer.ejs") %>
  <section>
</body>
```

- All strand pages now responsive, as they are based single \_layout.ejs

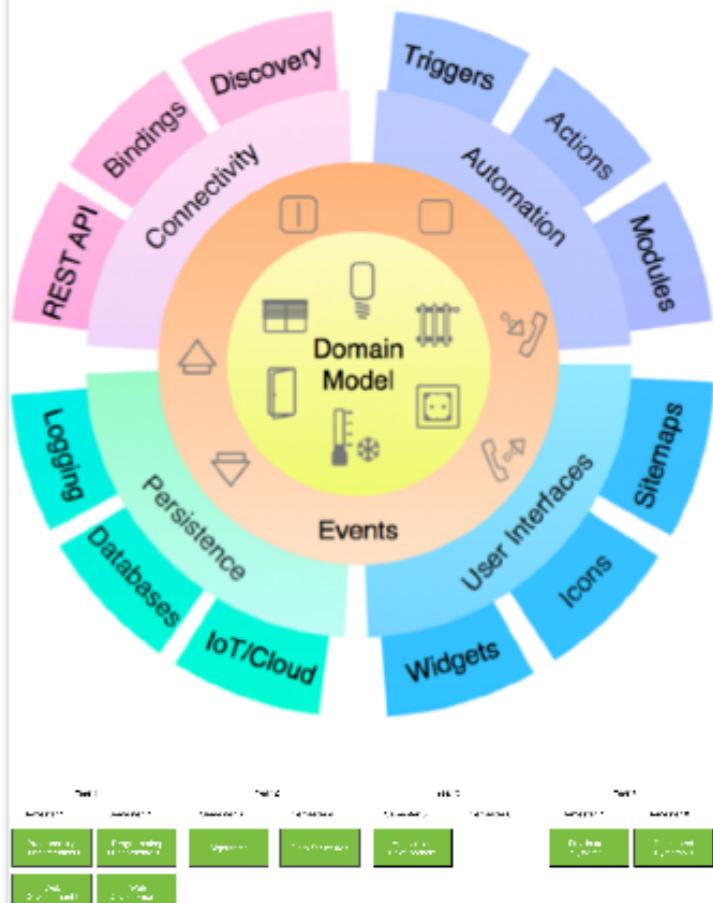
## Devices

The IoT professional must be comfortable when dealing with the many kinds of devices and systems that are the means for the Internet to interact with the environment. Such an awareness of the devices and systems made to perform well attributes may be ch



## Programming

The IoT requires a new breed of software skills, with an emphasis on flexible, reactive, and highly networked applications and services. This software runs on a diverse range of systems, is frequently connected to cloud services, and may be capable of leveraging large data sets to deliver inferences and decision support in an informed manner. The software is designed and implemented using agile techniques, with an emphasis on test driven development and quality user experiences..



```
if (emptyString ->
  Stars[classes_.all->
  ] // Since the title and the shortcut link are
  // positioned them need to each other is moved
  // Stars[title_sufix][add_or_remove_short-
  // cut][title_prefix and title_sufix]
  // or div using the title_prefix and title_sufix
  // shortcut-wrapper cleanin'
```

# Semantic-UI Libraries

---

```
iot-web-ejs
├── harp.json
└── public
    ├── assets
    │   ├── css
    │   │   ├── semantic.css
    │   │   └── themes
    │   │       ├── basic
    │   │       └── default
    │   │           └── github
    │   └── images
    ...
    ...
```

- This is the library:
    - semantic.css
    - + a set of icons and other assets
  - The project is not heavily dependent on these files
- 
- semantic.css is linked from all pages:

```
<link rel="stylesheet" href="/assets/css/semantic.css">
```

# Alternative Mechanisms for Linking Semantic.css

- Replace

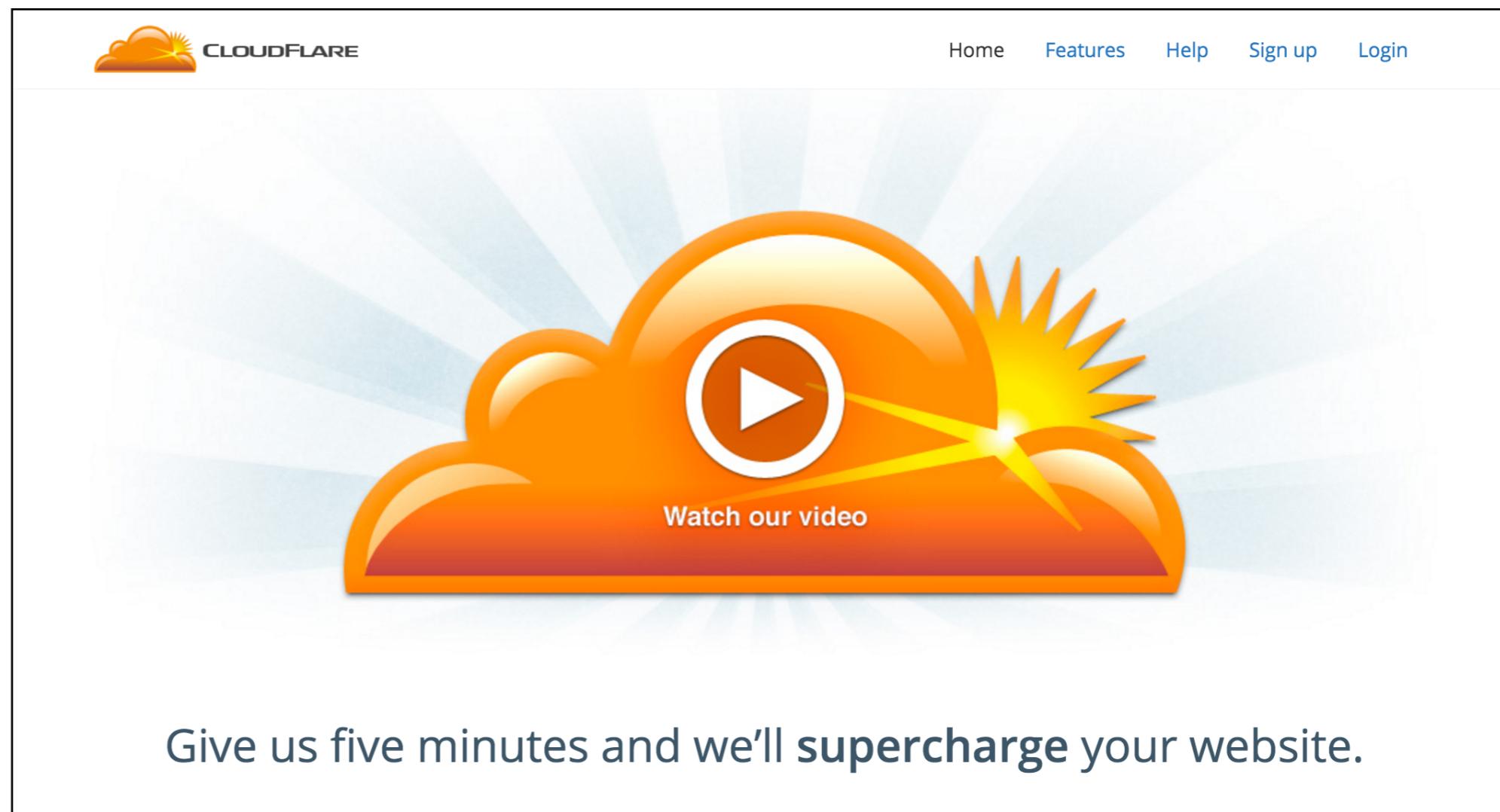
```
<link rel="stylesheet" href="/assets/css/semantic.css">
```

- 
- With

```
<link rel="stylesheet" href="https://cdnjs.cloudflare.com/ajax/libs/semantic-ui/2.1.6/semantic.min.css" type="text/css">
<script type="text/javascript" src="http://cdnjs.cloudflare.com/ajax/libs/jquery/2.0.3/jquery.min.js"></script>
<script type="text/javascript" src="https://cdnjs.cloudflare.com/ajax/libs/semantic-ui/2.1.6/semantic.min.js"></script>
```

- Cloud flare is a Content Delivery Network (CDN)

- It hosts many common libraries and assets in the cloud, simplifying access



- 
- Cloudflare is a Content Delivery Network (CDN)
  - It hosts many common libraries and assets in the cloud, simplifying access