

Electronic & Electrical Engineering

Information for Stage 1 Students

February 2024



UCD School of Electrical and
Electronic Engineering

Scoil na hInnealtóireachta
Leictrí agus Leictreonaí UCD

1

Introductions

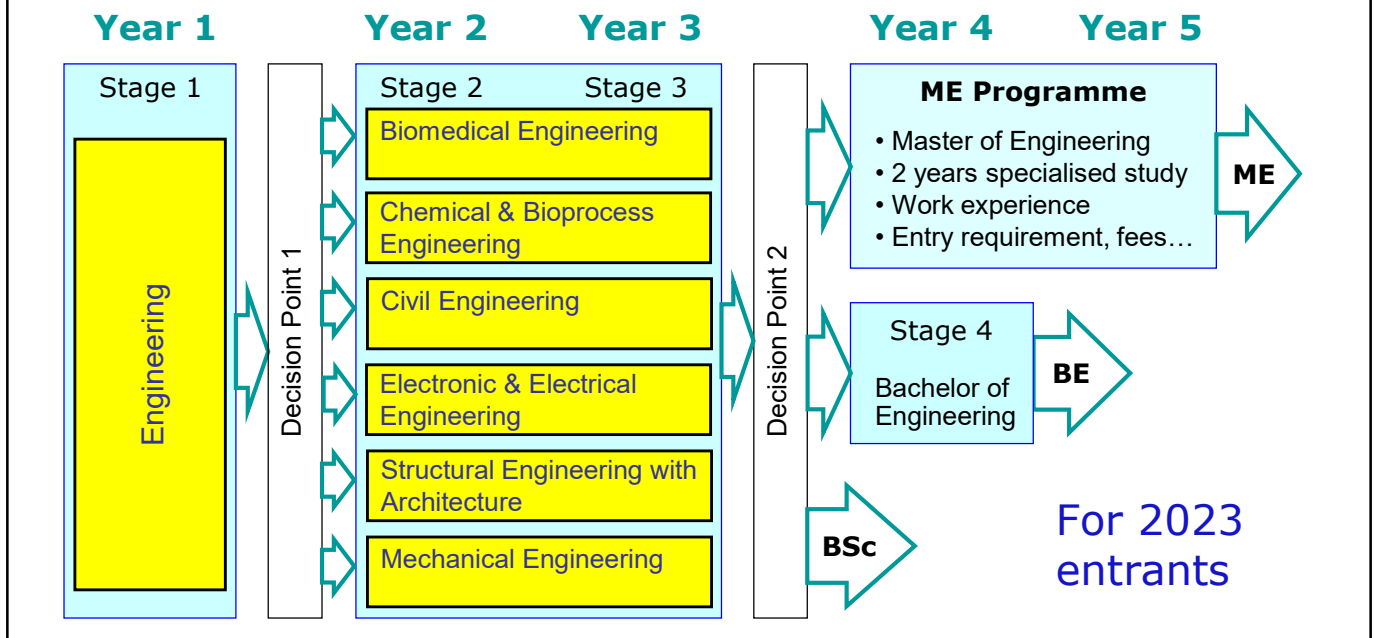
- **Hugh Fitzpatrick**
 - Stage 2 BE student, E&E Engineering
- **Jesse Onolememen**
 - Stage 4 BE student, Electrical Engineering
- **Danielle O'Connor**
 - ME student, Electronic & Computer Engineering
- **Brian Mulkeen** (brian.mulkeen@ucd.ie)
 - Programme Director,
BE Electronic & Electrical Engineering



2

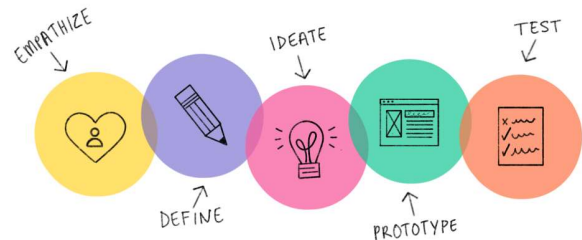
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UCD Engineering Pathways – DN150



3

What Do Engineers Do?



- **Design and Innovate**
 - create things that did not exist before
 - maybe a completely new concept
 - maybe just better, cleaner, safer, cheaper...
- **Solve problems**
 - making the world better (or some small part of it)
 - you might work on a few big problems in your career
 - or many smaller problems



4

4



Electrical Engineers



- Focus on electricity as a form of energy
 - for heat, light, transport, machines, etc.
 - usually large scale, high power
- Generating electricity – many new challenges
 - renewable energy is changing the norms...
- Transporting electricity to where it is needed
 - the “grid” is critical infrastructure in the 21st century
 - not just big wires now – “smart grid” needs control, communications, optimisation, etc.



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Electrical Engineers



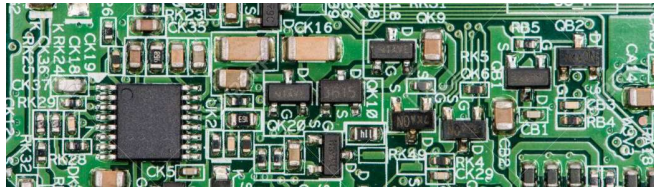
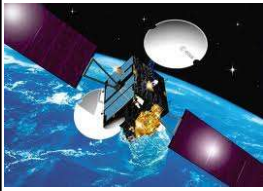
- Storing electricity – on a large scale
 - would bring huge benefits with renewable generation
- Electrifying transport – some good progress
 - but many problems remain to be solved
 - need chemical and mechanical engineers on the team
- Electrical machines, electrical installations
 - in every building, domestic, commercial, industrial
 - all designed by electrical engineers



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Electronic Engineers

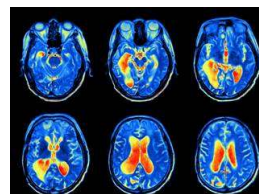
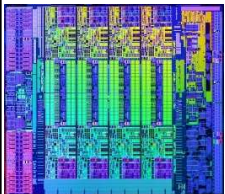


Intel Movidius

- Focus on electricity for information
 - computers – storing and processing information...
 - telecommunications – moving information...
 - entertainment – delivering content, gaming...
 - usually low power – do more with less energy?
- Electricity for control
 - electronic controls in aircraft, cars, washing machines...
 - often hidden, now becoming connected...



Smart Systems



- Many different systems
 - getting “smarter”
 - connecting to the Internet
 - “Internet of Things”
 - healthcare devices, wearables
 - home appliances
 - TV, washing machine...
 - home security, automation...



COMPATIBLE WITH
amazon alexa Google Home

Available on the
App Store
Get it on
Google play



Why Choose Electronic/Electrical?



- **Interesting and exciting field**
 - technology is changing all the time
 - making possible new products, new systems...
 - you have an opportunity to be part of that!
- **Broad field – you can specialise further later**
 - within the degree programme (more on this later...)
 - or after graduation – where you work, what you do...
- **Choose to suit your aptitude & interests**
 - relies heavily on maths – design, analysis, etc...
 - computer – use as a tool, to solve complex problems...
 - also write software, design hardware...



9

9

Electronic & Electrical Stage 2



- | | |
|------------------------------------|-----------------------------|
| • Computer Engineering | • Communication Systems |
| • Digital Electronics | • Electrical Energy Systems |
| • Electrical & Electronic Circuits | • Electromagnetic Fields |
| • Multivariable Calculus | • Electronic Circuits |
| • Solid State Devices | • Statistics & Probability |
- **Fundamentals of Electronic & Electrical Engineering**
 - both areas build on the same principles
 - so common curriculum in Stage 2
 - **Apply your knowledge to real-world problems**
 - lots of lab work, mostly in groups of two...



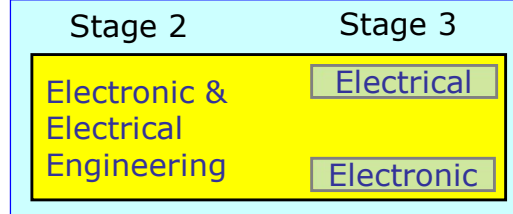
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10

E & E Stage 3

Core modules:

- Circuit Theory
- Computer Science
- Signals and Systems
- Multivariable Calculus
- Analogue Electronics
- Electromagnetic Waves
- Modelling and Simulation
- Signal Processing



Options: choose two of:

- Electrical Machines
- Power Systems Engineering
- Communication Theory
- Digital System Design

- **Specialise further: Electrical or Electronic**
 - by choosing two option modules
- **More complex topics, but more interesting...**
 - still plenty of laboratory & computer work



11

11

Study Abroad



- **Usually in Stage 3**
 - arranged through UCD Global...
 - need GPA ≥ 3.00 (for all Engineering students)
 - normally, all core module grades at least C-
- **Popular destinations:**
 - Australia
 - Canada
 - Singapore
 - USA
 - at least 10 different universities
 - **Europe: Erasmus**
 - France
 - Germany
 - Switzerland



12

12

Decision at end of Stage 3

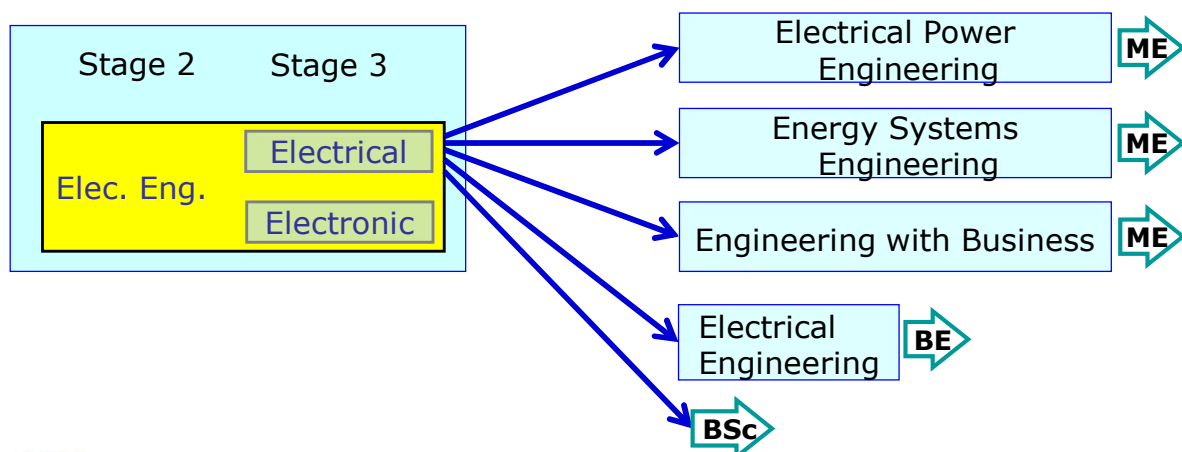
- Continue towards BE (bachelor of engineering)
 - four years study in total
 - traditional qualification for a professional engineer
- Enter ME (master of engineering) programme
 - two years specialised study (five years total)
 - various options available...
 - entry requirement, fees...
- Option to graduate with BSc (Engineering Science)
 - 3 years, 180 credits, not a professional qualification
 - for work or further study in another area
 - or for an ME programme elsewhere in Europe



13

13

Electrical Engineering Choices

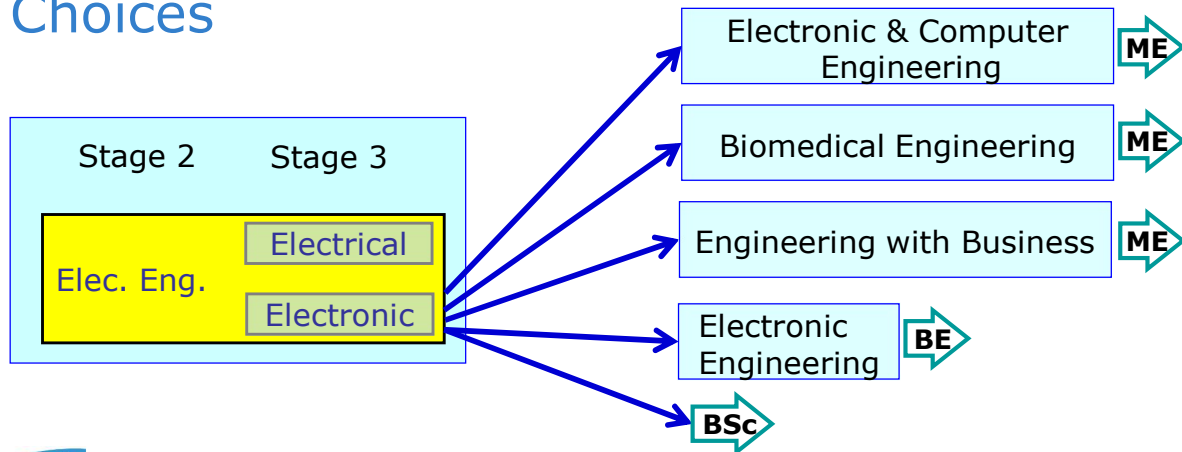


- Other options are possible...
 - these are the obvious paths in UCD at present
 - ME Energy Systems is also available from the Mechanical route

14

14

Electronic Engineering Choices



- Other options are possible...
 - these are the obvious paths in UCD at present
 - ME Biomedical is also available from the Biomedical route

15

15

ME Programmes

- Two years of study in your chosen field
 - making five years in total
 - includes a major project at Master level (20-25 credit)
 - includes a work placement (usually 7 months, 30 credit)
 - UCD will arrange this work placement
- Entry requirement
 - based on stages 2 and 3, weighting factors 3 and 7
 - minimum GPA 2.8 (equivalent to a C grade)
- Tuition fees
 - currently €9300 per year for EU students
 - usually only have to pay for last year...



16

16

Scholarships for ME Programmes

- Réalta scholarships from UCD - €9500
 - aimed at students for whom ME fees are an issue
- Industry wants more graduates in these areas
 - so offering incentives to encourage more students
 - scholarships vary from €2000 to €3000
 - for a small number of students each year
 - terms and conditions apply!

ARUP



- Arup
- Analog Devices Ireland
- Intel Ireland



17

Electrical & Electronic Engineering

HUGH FITZPATRICK
2ND YEAR

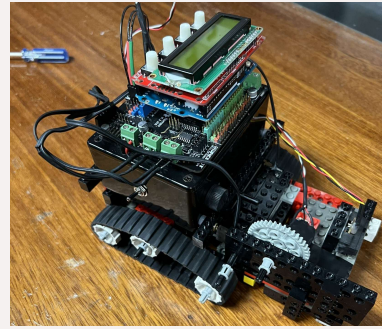
18

About me

Maths, Applied Maths, DCG, no Physics

Interest in coding and computers

First Year – Elec Circuits 1st Semester,
Physics 2nd Semester, CompSci Elective
& Robotics 2nd Semester

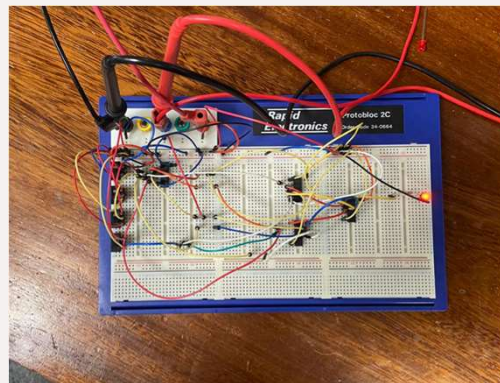
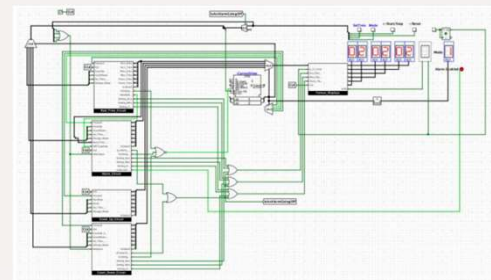
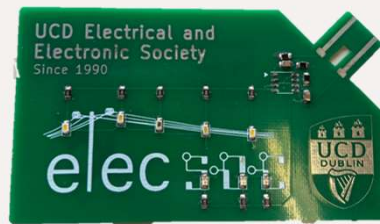


```

10 // Arduino IDE
11 // File  -> Examples -> 01 Blink
12 // Pin 13 has an LED connected on a Uno like Arduino board
13 // Constant pin number
14 const int ledPin = 13; // LED pin number
15 // Constant pin number
16 const int buttonPin = 2; // the pin of the pushbutton
17 // the pin of the pushbutton
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```

Elec Engineering – 2nd Year, What to Expect

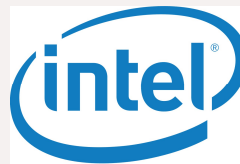
- Physics
- Coding
- Digital Logic (1st Year Module)
- Circuit Analysis
- Maths – Calculus, Statistics
- Fun stuff – Digital Labs, Circuit Labs, Digital Clock competition
- ElecSoc Events



My Career Future

1st Year Internship Completed!
 2nd Year Internship – Currently on the hunt
 Computer Engineering Industry

Re Internships – Make a LinkedIn



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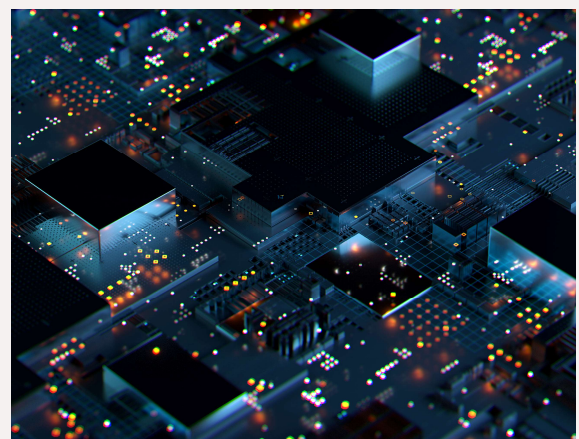
SAMPLE FOOTER TEXT

21

21

Why Elec Engineering?

- Enjoyed first year modules
- Interest in course content - circuits, power systems, information systems, coding & computers, electrical physics
- Coding – Often a perceived barrier, no need for any experience!



Our future is electrical & electronic – sustainable power, electric cars, AI, computer systems, quantum computing

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SAMPLE FOOTER TEXT

22

22

Thank you

Hugh.fitzpatrick2@ucdconnect.ie

Email me anytime – happy to help

Any questions?



2/20/2024

SAMPLE FOOTER TEXT

25

23

ME ELECTRONIC AND COMPUTER ENGINEERING

Danielle O'Connor
danielle.oconnor@ucdconnect.ie

24

INTERNSHIP

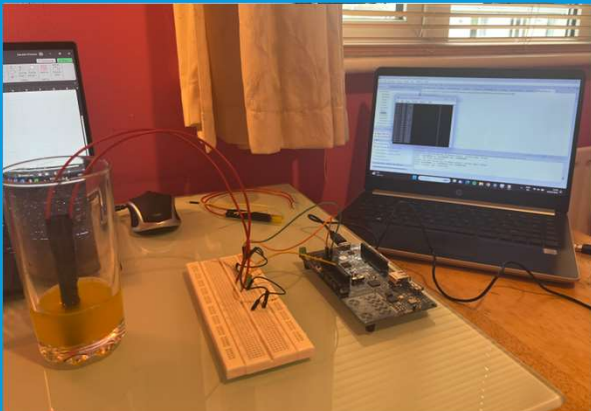


- Verification Engineer
- Verify the functionality of hardware/software by creating test cases and scenarios
- Worked on software that tested scripts by inserting 'bugs' and 'faults' into the design code to see if the verification code was able to find it

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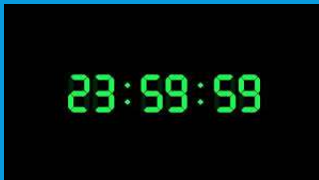
THESIS

- Capacitive Liquid Level Sensing



26

PROJECTS I'VE DONE IN ELEC



- Made a 24-hour clock starting from just gates in Digital Electronics (2nd yr)
- Made a calculator from scratch in Digital System Design (3rd yr)
- Made a Solitaire game and a Backgammon game written in Java in Software Engineering (4th yr)

```
[Player Stats] Score: 0 Moves: 0
D:      H:      C:      S:
P:      [24]

Lane 1: |10 of Spades|
Lane 2: |      x      ||7 of Clubs|
Lane 3: |      x      ||      x      ||9 of Spades|
Lane 4: |      x      ||      x      ||      x      ||King of Clubs|
Lane 5: |      x      ||      x      ||      x      ||Ace of Clubs|
Lane 6: |      x      ||      x      ||      x      ||      x      ||Ace of Diamonds|
Lane 7: |      x      ||      x      ||      x      ||      x      ||      x      ||Jack of Diamonds|
```

27

WHY DID I PICK ELECTRONIC ENGINEERING?

- Really enjoyed the electronic module in first year
- Leaves your options open
 - I was in between picking electronic and biomedical
- Enjoyed the coding option module
 - Don't have to be great at it
 - I never did any other coding before the option module



```
25
26 def check_db():
27     if not os.path.exists(PATH_DB):
28         db.create_db()
29
30 app.route("/")
31 def home():
32     check_db()
33     all_books = db.session.query(Book).all()
34     return render_template("index.html", books=all_books)
35
36 app.route("/add", methods=["GET", "POST"])
37 def add():
38
39     if request.method == "POST":
40         book_id = request.form["id"]
41         book_to_update = Book.query.get(book_id)
42         book_to_update.rating = request.form["rating"]
43         db.session.commit()
44         return redirect(url_for("home"))
```

28

Your Decision Now

Engineering Stage 1

Biomedical
Engineering

Chemical & Bioprocess
Engineering

Civil Engineering

Electronic & Electrical
Engineering

Structural Engineering
with Architecture

Mechanical
Engineering

- Choose one of 6 streams
 - for stage 2 and following
 - all other decisions can wait until later...



- Decision needed by Friday 12 April
 - collected by an on-line survey form
 - from Engineering & Architecture College Office

29