



# Electrical & Electronic Engineering

## Professional Experience Programme (PEP)

### BE (Hons) Degree in Electrical & Electronic Engineering



The BE (Hons) Degree course in Electrical & Electronic Engineering at NUI Galway is a four-year full-time degree programme. During the first two years, students study foundation Engineering and Science subjects, including Electronic Engineering, Computing, Physics, Chemistry, Engineering Graphics and Mathematics. Practical labs support the subject material. In their third and fourth years, students learn the advanced technical skills required in the engineering profession, i.e. structured analysis, design of electrical and electronic systems, implementation and test of electronic circuits and software applications to professional standards using both traditional

and computer-aided methods. Application areas include Power Electronics, Control Systems, Communications, Digital Signal Processing and VLSI Design. Students also receive courses in economics, business management and project management. In third year, prior to PEP, students complete a year-long project working in groups of two. This exercise provides them with technical experience in a specific area of Electrical & Electronic Engineering, in addition to developing their skills in project management and team work.

Further information on Electrical & Electronic Engineering may be obtained at [www.eee.nuigalway.ie](http://www.eee.nuigalway.ie)

#### Primary areas of undergraduate training

Power Electronics & Electrical Machines	Electromagnetism, DC and AC machines, three-phase systems, power quality, rectifiers, inverters and DC-DC converters	Signal Analysis & Analogue Communications	Fourier analysis, signal processing, filter design, Matlab/SPICE analysis, analogue communication techniques, digital modulation and transmission, electrostatic and magnetostatic theory, antennae, transmission lines, microwaves, EMC
Control Systems	Feedback, stability, performance analysis, control system design	Communication Systems Engineering	Datacomms protocols, LANs, WANs, ISDN, ATM, mobile and satellite communication telecommunications software apps, protocol specification, intelligent networks
Analogue System & Semiconductor Technology	Analogue circuit design and analysis, semiconductor physics, characteristics of circuit elements, technology options, IC design and layout, silicon fabrication	Digital Signal Processing	Fundamental theory, time-domain and frequency-domain analysis, system design, digital filters, multirate systems. Applications: speech and image processing, communications, adaptive filters, biomedical signal processing
Digital Systems Design	Embedded digital system design techniques and applications. Structured design and documentation methodology. Microprocessor architectures, VHDL, simulation and synthesis. ASIC/FPGA technologies and implementation. Testability		
Programming & Software Engineering	C, visual programming, structured software design methodology, system analysis, testing and QA, modularity/maintenance, object-oriented programming		

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### Students can carry out the following roles:

- Technical Support
- Software Development
- Programming
- Graphic Design
- Software Research
- Documentation
- Database Validation
- Customising Software
- Reporting
- Debug and error reporting
- Hardware Research
- Software Testing
- Work on the Intranet
- Web Servers
- Circuit Board Design
- Write Test Scripts
- Website Development and Update
- Networks
- Circuit Board Testing
- Electronic Component Production
- Hardware Research
- System Integration



### Final Year individual project.

During the PEP, participating companies may offer the student project work that could become the basis of the student's subsequent final-year project. This offers an on-going benefit to both company and student.

Examples of recent industry-related individual final year student projects (20% of degree marks):

Project Supervisor Name/Tel/Email	Project Title
<b>Dr. John Breslin</b> Tel: +353 91 492622 john.breslin@nuigalway.ie	<ul style="list-style-type: none"> <li>• Modern PDA technology for effective handheld solutions in the retail industry.</li> <li>• Home automation with an internet table and LinuxMCE.</li> </ul>
<b>Dr. Peter Corcoran</b> Tel: +353 91 492764 peter.corcoran@nuigalway.ie	<ul style="list-style-type: none"> <li>• A microprocessor-controlled variable power supply for industrial instrumentation.</li> <li>• A java-based system to control and download data from a digital oscilloscope via RS-232.</li> </ul>
<b>Dr. Maeve Duffy</b> Tel: +353 91 493972 maeve.duffy@nuigalway.ie	<ul style="list-style-type: none"> <li>• DC/DC converters for handheld electronic devices.</li> <li>• Development of an automated test setup for magnetic sensors used in automotive applications.</li> </ul>
<b>Dr. Martin Glavin</b> Tel: +353 91 492035 martin.glavin@nuigalway.ie	<ul style="list-style-type: none"> <li>• JPEG image compression for automotive systems.</li> <li>• RFID-based hospital patient monitor using web infrastructure.</li> </ul>
<b>Prof. W.G. Hurley</b> Tel: +353 91 493136 gerard.hurley@nuigalway.ie	<ul style="list-style-type: none"> <li>• Battery management system for standby power.</li> <li>• Power electronics for automotive applications.</li> </ul>
<b>Dr. Edward Jones</b> Tel: +353 91 492720 edward.jones@nuigalway.ie	<ul style="list-style-type: none"> <li>• Frequency domain adaptive filtering.</li> <li>• Noise suppression for speech communication.</li> </ul>
<b>Dr. Liam Kilmartin</b> Tel: +353 91 492749 liam.kilmartin@nuigalway.ie	<ul style="list-style-type: none"> <li>• Perceptual speech quality analysis in mobile and VoIP networks.</li> <li>• Mobile inter-network mobility management.</li> </ul>
<b>Dr. Fearghal Morgan</b> Tel: +353 91 493137 fearghal.morgan@nuigalway.ie	<ul style="list-style-type: none"> <li>• Implementation of an FPGA-based platform for intrinsic evolution of digital circuits.</li> <li>• Secure wireless financial transaction system prototype development.</li> </ul>
<b>Prof. Gearoid Ó Laighin</b> Tel: +353 91 492685 gearoid.olaghin@nuigalway.ie	<ul style="list-style-type: none"> <li>• Fall detection system for elderly patients.</li> <li>• Accelerometer-based personal trainer system.</li> </ul>