



Institiúid Teicneolaíochta Chorcaí  
Cork Institute of Technology

## INTR8014: Nano-Scale Technology

### Module Details

<b>Short Title:</b>	Nano-Scale Technology <b>APPROVED</b>
<b>Full Title:</b>	Nano-Scale Technology: designing and manufacturing with atomic and molecular scale building blocks
<b>Module Id:</b>	4058

<b>Official Code:</b>	INTR8014	<b>NFQ Level:</b>	8	<b>ECTS Credits:</b>	5
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<b>Coordinator:</b>	JOSEPH CONNELL
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<b>Description:</b>	The electronics industry has always prided itself and has based its unprecedented growth on making things smaller and smaller. Nano-scale technology takes this to its ultimate by taking atoms and molecules as its starting point and using them as building blocks to develop entirely new nano-materials, nano-structures and nano-scale components that are beginning to enable previously undreamt of product concepts. Nano-scale technology finds applications in every engineering and science discipline and there are opportunities and applications for all disciplines in the field of nano-scale technology. No student in these disciplines can therefore afford to be ignorant of its fundamentals, capabilities and applications. This module is intended to provide that essential knowledge in a manner that will be accessible to all students in the engineering and scientific disciplines.
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### Learning Outcomes:

*On successful completion of this module the learner will be able to...*

1. Describe the concepts and fundamentals of nano-scale technology and understand its potential applications, regardless of their starting engineering or science discipline,
2. Describe the fabrication processes and equipment involved in nano-scale technology, nano-materials and nano-devices.
3. Describe and discuss existing and potential products based on nano-scale technology
4. Conceive of and discuss applications of nano-scale technology that are specific to an individual student's own discipline and the contributions that the student's own discipline can make to the field of nano-scale technology.

### Pre-requisite learning

#### Module Recommendations

*This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named CIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).*

Level 7 course in Science or Engineering and a keen interest in new technology

#### Incompatible Modules

*These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.*

No incompatible modules listed

#### Module Requirements

*This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed. You may not enrol on this module if you have not acquired the learning specified in this section.*

No requirements listed



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## Module Content & Assessment

### Indicative Content

- **Fundamental concepts**

Introduction to materials, fabrications, categories and multi-disciplinary applications of nano-scale technology

- **Fabrication**

Fabrication processes and equipment involved in nano-scale technology, nano-materials and nano-devices

- **Categories of nano-scale devices**

The different categories of nano-scale devices: nano-magnetics, nano-electronics, nano-optics, nano-electromechanical systems, nano-biotechnology and nano-fluidics

- **Applications**

The applications and products enabled and potentially enabled by nano-scale technology in different engineering and scientific disciplines

### Assessment Breakdown

	%
Course Work	100%
End of Semester Formal Examination	0%

### Coursework Breakdown

Type	Description	Outcome addressed	% of total	Assessment Date
Written Report	Selected nano-scale technology concept relevant to the individual student's main discipline	1,2	30	Week 6
Written Report	Selected nano-scale device category relevant to the individual students main discipline	2,3,4	30	Week 10
Presentation	Relevance and applications of nano-scale technology in the individual student's main discipline	3,4	40	Sem End

**The institute reserves the right to alter the nature and timings of assessment**



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### Module Workload & Resources

Workload	Full-time mode			
Type	Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	No Description	3	Every Week	3.00
Lab	Visits to Tyndall National Institute and CRANN Nanotechnology Centre	13	Twice per Semester	1.73
Independent & Directed Learning (Non-contact)	No Description	2	Every Week	2.00
Total Weekly Learner Workload				6.73
Total Weekly Contact Hours				4.73

### Resources

#### Recommended Book Resources

- **Massimiliano Di Ventra (Editor), Stephane Evoy (Editor), James R. Heflin (Editor) 2004, *Introduction to Nanoscale Science and Technology*, Har/Com edition Ed., Kluwer Academic Publishers; [ISBN: ISBN-13: 978-1402077203]**

#### Supplementary Book Resources

- **Lawrence D. Gasman 2006, *Nanotechnology Applications and Markets*, Artech House [ISBN: ISBN-13: 978-1596930063]**